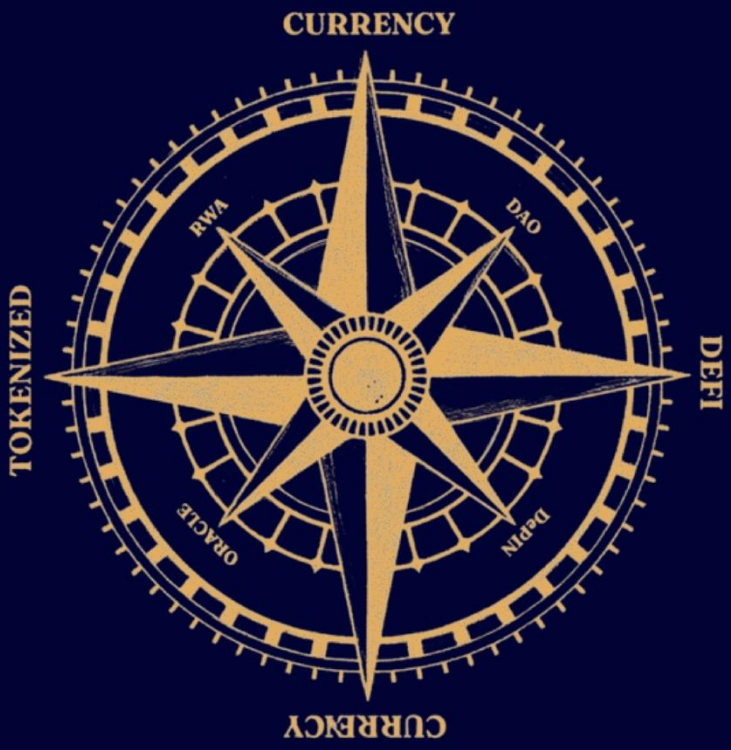
Decode the future of finance.

THE DIGITAL PATH



Oliek Orla

Oliek Orla
The Digital Path

THE DIGITAL PATH

DECODE THE FUTURE OF FINANCE

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3. **Timeliness:** The digital asset market evolves rapidly. The author does not guarantee that all information in this book will remain current at the time of reading.
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Before making any financial decisions, always conduct your own research (DYOR — Do Your Own Research).

CONTENTS

THE TRANSITION TO A NEW FINANCIAL SYSTEM 6

ADDRESS TO THE READER 10

IT ALL STARTS WITH AN IDEA — CODE 12

Chapter 1 - Historically: foundational these

PART I: ADOPTION 16

PART II: GENERATIONAL THEORY 19

PART III: INFLATION—THE SAME ACTIONS, DIFFERENT OUTCOMES 22

PART IV: RIDING THE WAVE OF LOW INFLATION 26

Chapter 2 - Fundamentals of Digital Assets

PART I: DIGITAL ASSETS 32

PART II: BLOCKCHAIN TECHNOLOGY 33

PART III: CRYPTOCURRENCIES 46

PAST IV: WEB3 48

Chapter 3 - Infrastructure of Digital Assets

PART I: DIGITAL INFRASTRUCTURE OF THE ECOSYSTEM 52

PART II: ECOSYSTEM COMPONENTS 61

PART III: DECENTRALIZED GOVERNANCE MODEL 95

PART IV: ETHEREUM ECOSYSTEM 98

Chapter 4 - Digital Integration

PART I: NETWORK VALUE 133

PART II: TRENDS ON THE PATH TO ADOPTION 139

PART III: THE FRAMEWORK OF A NEW FINANCIAL SYSTEM 148

PART IV: THE DIGITAL ECONOMY 157

Chapter 5 - Do Your Own Research

PART I: DO YOUR OWN RESEARCH 172

PARK II: MARKET SCANNING 177

PART III: FUNDAMENTAL ANALYSIS 183

PART IV: MARKET AND FINANCIAL ANALYSIS 189

PART V: TOKENOMICS 224

Chapter 6 - Bitcoin Economic Analysis

PART I: THE NATURE OF CYCLICALITY 246

PART II: MINING AND HALVING 249

PART III: THE NETWORK 252

PART IV: MARKET PHASES WITHIN THE CYCLE 261

PART V: ECONOMIC ASPECTS 278

Chapter 7 - Vision of the Future

PART I: BITCOIN 285

PART II: ETHEREUM 318

PATH III: OTHER DIGITAL PROJECTS 323

Chapter 8 - Investment Strategies

PART I: DCA STRATEGY (DOLLAR-COST AVERAGING) 328

PART II: THE BUY THE DIP STRATEGY 330

PART III: THE COMBINED STRATEGY (DCA + BUY THE DIP) 333

PART IV: PORTFOLIO STRUCTURE AND DIVERSIFICATION 335

PART V: PORTFOLIO REBALANCING 338

PART VI: BEHAVIOR DURING CRISIS EVENTS 341

CLOSING REMARKS 344

APPENDIX: 346

A BASIC TOOLKIT FOR ANALYZING CRYPTO PROJECTS AND TRACKING DEVELOPMENT ACTIVITY (DYOR) 346

THE TRANSITION TO A NEW FINANCIAL SYSTEM

The world of finance stands on the brink of a profound transformation. What seemed impossible not long ago—the emergence of Bitcoin, Ethereum, and other digital assets—has accelerated a shift in the rules of the game. Money, investments, economic models, and the very approach to preserving and growing capital are undergoing fundamental change.

Digital assets are forming the foundation of a new, economically decentralized landscape. Having moved beyond their early-stage origins, they are now entering a phase of mass adoption. Gradually and almost quietly, they are integrating into every aspect of economic life, reshaping traditional perceptions of finance.

Like any systemic innovation, this transition brings not only unique opportunities but also new risks. The shift from experimentation to everyday use always takes time. Global crises, geopolitical instability, regulatory challenges, and trade wars, as well as a lack of high-quality knowledge and widespread misconceptions shaped by social media, have become a reality for anyone taking their first steps in this new environment.

I am confident that this book will serve as your guide in this new economic era. It will explain the nature of digital assets and share practical insights and experience that have helped me recognize their true potential. You will learn not to fear change, to navigate economic turbulence with confidence, and to use it to your advantage. This book will help you make informed investment decisions, avoid common mistakes, and build long-term financial strategies for yourself and future generations.

Whether you are just beginning your journey or already have investment experience, this material will help you better understand the direction of future change and adapt more quickly to new realities.

The world belongs to those who are ready to think bigger, act boldly, and remain thoughtful at the same time.

We are living through a historic moment—a rare window of opportunity that comes along once every few decades. Much like the introduction of the gold standard in the nineteenth century or the transformation of stock markets in the 1970s, the beginning of the twenty-first century is ushering in a new financial era.

Now is the time to seize these opportunities. This is the moment to invest in knowledge, make well-informed decisions, and act with clarity and intention.

AUTHOR'S STORY

When I first learned about digital assets, they felt distant and difficult to understand. But over time, I realized that what stood before me was not just another hyped trend everyone was talking about—it was a fundamental shift in how we understand the future of finance.

My introduction to digital assets began, quite naturally, with Bitcoin. I wasn't among those who followed its emergence in 2009 but the events that unfolded afterward captured my attention so deeply that they became part of my personal story. I clearly remember the moment I first heard about Bitcoin. It was around 2011 or 2012, and there was a wave of conversations filled with enthusiasm and curiosity. At the time, Bitcoin truly felt like a revolutionary phenomenon—something capable of reshaping the established order.

Back then, the primary source of information was people already involved in mining, sharing their experiences on forums. News coverage mostly focused on the price volatility of the first digital asset. Initially, I believed Bitcoin could only be mined using specialized software and powerful computer hardware. The idea that you could simply buy it—as you can today—was rarely discussed. The only realistic scenario was a coincidence: a distant acquaintance of a friend working in IT who happened to be an early mining enthusiast. In such a case, you might have had a chance to buy Bitcoin directly. In my case, that opportunity never came.

Later, I learned that even in the United States—the place where this asset was most likely created—access to reliable information about Bitcoin was quite limited. Most of it spread through scattered stories discussed on forums or in the form of memes.

One of the most fascinating and widely shared stories was about a man on a crypto forum who offered 10,000 bitcoins in exchange for two pizzas delivered by another user.

At the time, it felt more like a joke, since I didn't have a clear understanding of the actual transaction mechanisms. However, that story

became the catalyst for my active pursuit of knowledge. It turned out that ways to purchase already existed but primarily in a P2P format. You had to find a stranger on a forum or social media and arrange an exchange. This came with significant risks, as there were no guarantees of reliability for such transactions

In 2014, I learned from the news about the centralized exchange Mt. Gox, which connected Bitcoin buyers and sellers—and about its bankruptcy. At the same time, I watched a sharp price decline, from around $1,000 to $200. This created a sense of distrust and uncertainty. During that period, my focus was on building my career, so for quite some time, everything related to Bitcoin faded into the background.

During one of our conversations with friends, we brought up Bitcoin and its price again. We were struck by how rapidly it had risen—from $1,000 to $3,500 and eventually to $10,000. I assumed the price would inevitably correct and likely fall back to around $3,000. At the time, I had no idea that this assumption would turn out to be surprisingly accurate. In 2018, on the Bitstamp exchange, Bitcoin was trading at just over $3,000. The decline repeated the same pattern seen four years earlier: a sharp drop followed by a gradual recovery. This time, however, there were no bankruptcies or technical failures capable of halting the network.

That moment became a turning point in my personal journey of exploring digital assets. The first pieces of a coherent picture began to fall into place, and what once seemed like a chaotic collection of events gradually started to make sense. I began to recognize the cyclical nature of the market, driven by Bitcoin halving events, developed an understanding of the role of global market makers, and started paying attention to the emergence of new projects and the influence of key opinion leaders shaping market sentiment.

My professional background played an important role in this process. Experience in analysing complex systems, working with data, and making decisions under uncertainty allowed me to filter out noise more effectively, identify cause-and-effect relationships, and avoid getting distracted by short-term price fluctuations. This made it possible to understand the

deeper logic behind the processes and to recognize value that extended far beyond everyday speculation.

A painful yet extremely instructive phase came with the high-profile collapses of centralized exchanges and the bankruptcies of major projects.

They undermined trust and caused disappointment but at the same time pushed me to ask the right questions and dive deeper into the fundamental principles of decentralization, security, and transparency.

Over time, it became clear that these events were not random but rather part of a broader global process shaping a new economic reality.

In this book, I invite you to join me on this journey. This is not just a narrative about events or technologies—it is a path toward building a holistic understanding of the digital asset industry. We will move step by step through its key stages of development, focusing on pivotal moments that influenced emotions, reshaped thinking, and forced a re-evaluation of how we understand finance and value.

We will also explore the evolution of the market and the reactions of its participants—from newcomers to large institutional players. As a result, you will begin to see the connections between events, systematize the key elements, and form a comprehensive view of the digital landscape. This will serve as a foundation for making informed decisions and applying this knowledge in real life.

I would like to express my sincere gratitude to every reader for the time you have dedicated to this book. You are always welcome to ask your questions—either directly to me or to my team of assistants—and receive a comprehensive and detailed response.

May 2026

Oliek Orla

ADDRESS TO THE READER

I am not a professional economist, nor do I aim to present myself as an expert who has answers to every financial question. I am one of millions of people who, at some point in their lives, became interested in digital assets—going through doubt, mistakes, losses, attention traps, and moments of discovery. Over time, however, I began to see far more in this space than just an investment instrument. It is this experience that I aim to share with you—in the most structured and clear way possible.

This book is not about ready-made formulas for quick profit, nor is it a set of instructions to be followed blindly. Rather, it is my personal map of the journey—a way of thinking and exploring that helped me break down the complex and often chaotic world of digital assets into understandable parts. Each of us has a different financial background, different goals, and a different level of risk we can afford to take. Therefore, everything you read here should be seen as material for your own learning and development, not as direct instructions for action.

All the insights I share were not formed overnight. They are the result of years of observation, thousands of hours of reading technical documentation, white papers, market analysis, on-chain data, and macroeconomic research. But just as important were the mistakes—sometimes painful, sometimes very costly. They taught me to look deeper, to resist emotional reactions, and to search for real value where most people see only noise.

My goal is simple, yet deeply personal. I want this book to help you stop fearing complex topics, learn to ask better questions, and gradually build your own independent understanding of digital assets and financial processes as a whole. If this book becomes a point of support for you, a catalyst for deeper exploration, or simply helps you avoid a few common mistakes—then it will have been worth writing.

IT ALL STARTS WITH AN IDEA — CODE

The idea of electronic decentralized money is not new—it existed long before 2009. As early as 1983, David Chaum introduced eCash, a protocol for anonymous payments that laid the foundation for digital privacy in finance. In 1998, Wei Dai and Nick Szabo developed the concepts of B-money and Bit Gold, attempting to combine cryptography with economic incentives. However, these early frameworks remained theoretical. Technical limitations of the time, the absence of mature incentive mechanisms, and relatively high trust in the traditional financial system prevented these ideas from evolving into fully functional, working models.

The Emergence of Bitcoin

The turning point came in January 2009, when an anonymous individual or group under the pseudonym Satoshi Nakamoto launched the Bitcoin network. The first block—known as the genesis block—was mined, carrying a reward of 50 BTC. The new system operated without any central authority and enabled value transfer directly between users, without banks or other intermediaries.

Bitcoin's creation was a direct response to the 2008 financial crisis, which severely undermined trust in traditional banking and state institutions. For the first time, a practical mechanism for digital money emerged—one that required no permission and no third-party control.

The Formation of a New Structural Cluster

Following Bitcoin's launch, the industry began to evolve rapidly. In 2011, Litecoin appeared as the first attempt to technically improve the original model. In 2013, Ripple introduced solutions for interbank payments, while from 2014 onward, projects such as Monero focused on enhancing privacy in digital transactions.

At the same time, Ethereum laid the foundation for smart contracts and programmable finance, significantly expanding the use cases for digital assets.

Starting from 2010, dozens of new initiatives emerged every year. This gradually evolved into a full-fledged industry built around tokens, smart contracts, centralized and decentralized exchanges, DeFi, DAOs, and NFTs. Since 2024, this ecosystem has increasingly expanded into new verticals, including Real-World Asset tokenization (RWA), Decentralized Physical Infrastructure Networks (DePIN), and the integration of Artificial Intelligence (AI)-driven solutions.

Development Dynamics

Statistical data clearly illustrates the scale of transformation. By the end of 2014, there were approximately five hundred projects in existence. Over the next five years, this number grew to more than four thousand. Today, the number of active projects stands at around seventeen thousand, and if we include all crypto-related concepts ever created, the total exceeds hundreds of thousands.

YEAR OF LAUNCH	NUMBER OF DEAD COINS
2021	2584
2022	213,075
2023	245,049
2024	1,382,010
2025	11,564,909

Table: Number of Failed Projects

We can also observe an extremely sharp increase in project failures starting from 2024. This clearly demonstrates that the crypto industry evolves through continuous experimentation, intense selection pressure, and high levels of risk—within which only truly viable models survive. These are the projects that demonstrate real-world applicability and meaningful integration into everyday life.

1

CHAPTER

Historically: Foundational These

"Understanding the crossroads of generations we are currently standing at, combined with an awareness of the cyclical nature of economic processes and their impact—particularly inflation—opens a fundamentally different perspective on the financial world, creating unique opportunities for the future. "

As of 2025, the number of people who own or use cryptocurrencies continues to grow significantly each year. According to the financial company Triple-A, there are approximately 562 million crypto holders worldwide, representing about 6.8% of the global population.

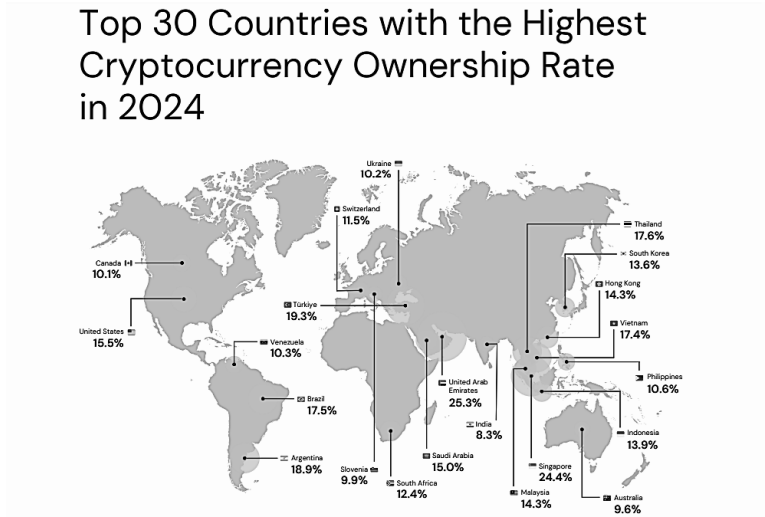
Today, access to cryptocurrencies has become so simple and largely independent of geographic location that it can be compared to making an online purchase from a well-known brand. For younger generations, it is a familiar digital process, while for older generations it can be compared to a standard purchase at a nearby shopping center. In most cases, all that is required is a smartphone and an internet connection.

Part I: Adoption

Despite this, a significant portion of people still react to the word "cryptocurrency" with scepticism. This is largely due to misconceptions shaped by social media, sensational headlines, and superficial judgments. The reality today is different—digital assets already provide tangible, real-world utility. They help millions of people preserve savings, pay for goods and services, and execute fast international transfers with minimal fees—without the involvement of intermediaries.

Each year, more users join the crypto market, and the paradigm of distrust is gradually being replaced by a more informed understanding of the advantages digital assets bring to the modern economy.

The leading countries in terms of crypto adoption and ownership include the United Arab Emirates, Singapore, Turkey, Argentina, Brazil, Thailand, Vietnam, and the United States. (The ownership ranking is presented below.)



Source: State of Cryptocurrency Ownership Worldwide in 2024 | **Triple-A**

Over years of studying this industry, several key aspects have been identified.

Main factors driving user adoption:

1. **Social and informational environment**.
   Exposure to cryptocurrency-related content across social media, traditional media, television, and personal communication networks.
2. **High return potential**.
   Most newcomers are attracted by the possibility of rapid asset appreciation and the prospect of significant profits.
3. **Global accessibility.**
   Participation in financial transactions without geographical restrictions and without the need to open a bank account or be tied to a specific country.
4. **Hedge against inflation and economic instability.**
   In countries experiencing high inflation or financial uncertainty, cryptocurrencies are often perceived as a way to preserve purchasing power.
5. **Technological innovation.**
   Interest in emerging technologies and decentralized solutions encourages many people to explore and invest in this sector.
6. **Generational shift.**
   New generations are forming their own financial habits, introducing alternative financial approaches, and driving their mass adoption.

In summary, the first two factors account for approximately 75% of new user adoption. Informational noise, curated success stories, and examples of outsized profits—widely amplified by public figures and influencers across major communities on X, Telegram, and YouTube—significantly shape perceptions of the crypto market.

The third and fourth factors relate to users who utilize digital assets for everyday transactions due to limited access to traditional banking systems or in environments with high inflation. Their share is estimated at around 10%.

The fifth factor includes two groups: developers and ecosystem participants who directly build and implement digital assets, as well as investors who view them as an alternative financial instrument. Together, they account for approximately 15%.

The sixth point deserves separate in-depth consideration—it is often the starting point of a deeper transformation in financial thinking, and we will return to it later in this book.

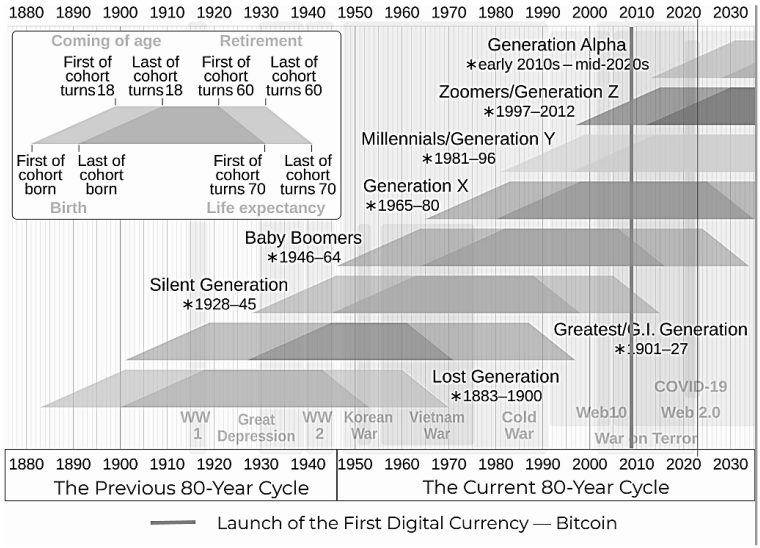
Part II: Generational Theory

Each generation makes a unique contribution to the development of society, shaping and accelerating social, political, and economic processes that directly influence the economy as a whole. The Strauss–Howe Generational Theory describes the cyclical nature of societal development through a sequence of four recurring periods of social transformation, each lasting approximately 20–22 years.

Within this framework, four phases are identified:

1. High (~20 years)
2. Awakening (~20 years)
3. Unravelling (~20 years)
4. Crisis (~20 years)

Together, they form a full cycle lasting roughly 80–90 years, which the authors of the theory called a *saeculum*—a Latin term meaning "a full human lifetime." To better understand the logic of this theory and its connection to modern global transformations, it is useful to examine historical processes from a longer-term perspective.



Source: Chronology of Generations in the Western World | **Wikimedia**

The historical perspective clearly illustrates the succession of generations within an 80-year cycle (*saeculum*), as well as the key historical events that have shaped the worldview of each of them. According to this framework, the current cycle we are living through began at the end of World War II, around 1946–1949, and started with the high phase. The visualization clearly shows how each generation is born, matures, enters its period of active influence on society, and gradually passes the torch to the next.

It is particularly important to note that major technological and economic shifts almost always coincide with the crisis phase, which concludes each cycle. According to the current historical moment, we are now in the final crisis phase of the 80-year cycle.

It is precisely at this stage, amid profound socio-economic transformations, that the first decentralized digital currency—Bitcoin—was launched in 2009. This moment is marked separately in the framework, as it was not accidental: Bitcoin emerged in parallel with the global financial crisis and a sharp decline in trust toward traditional banking and financial institutions. According to researchers' estimates, the peak of the current cycle is expected between 2027 and 2029, making the present period one of the most significant for understanding upcoming economic, technological, and social shifts.

The sequential change of generations is one of the primary driving forces of societal development. Generations shaped by major historical events transform values, behavioral models, and fundamental perceptions of the world. Each new generation not only reinterprets the experience of its predecessors but also adapts it to new technological and social realities.

In this context, digital assets no longer appear as a random phenomenon. Cryptocurrencies are becoming a symbol of a new stage of development, where emerging digital financial instruments such as DeFi and RWA reflect a new worldview—one in which finance becomes decentralized, globally accessible, and independent of traditional intermediaries.

The community of people whose worldview was shaped after the launch of Bitcoin in 2009 grew up in an environment of rapid digitalization and unprecedented technological freedom. The global financial crisis

significantly undermined trust in traditional economic institutions, exposing the inability of the banking system to ensure stability, reliability, and the preservation of purchasing power. As a result, this new wave of market participants increasingly relies less on classical financial instruments—such as bank deposits, government bonds, or pension systems—and instead actively seeks alternative ways to preserve and grow capital. Distrust in centralized governance models has become one of the key drivers behind the growing interest in decentralized digital assets, particularly Bitcoin.

For this emerging community, crypto assets are not something exotic or difficult to understand, as is often the case with older generations but rather a natural part of everyday life. Users already possess a set of basic and applied skills, including:

- understanding how blockchain technology works
- active use of crypto wallets
- participation in decentralized finance protocols
- viewing digital assets as the foundation of a new financial architecture.

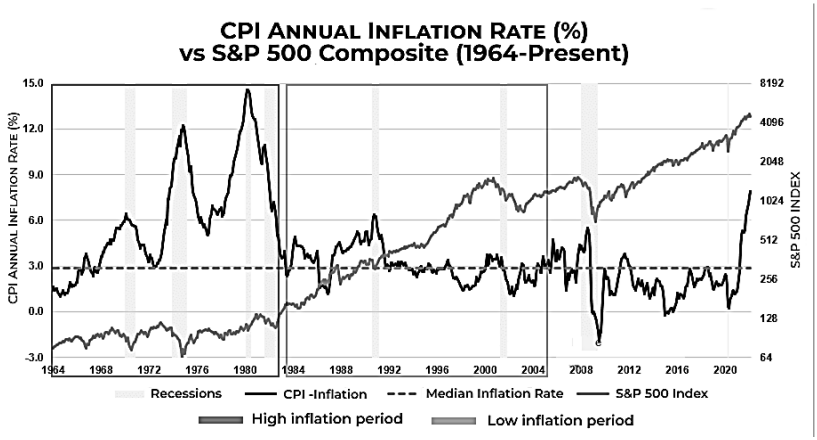
This community is becoming the first generation of participants in an alternative global financial system. At the same time, it is important to rethink the very concept of a "crisis." History consistently shows that every crisis is not an endpoint but a turning point after which renewal begins. Periods of instability give rise to the most radical technological innovations that define the direction of development for decades ahead.

Bitcoin emerged as one such innovation—a response to the crisis of trust in traditional financial institutions and a symbol of the transition toward new economic models. Therefore, a crisis should not be perceived as an end but rather as the beginning of a new development phase, opening space for deep transformation, the rethinking of legacy systems, and the formation of a new economic and technological landscape.

Part III: Inflation—The Same Actions, Different Outcomes

When it comes to investing, successful investors, and capital accumulation outcomes, attention is usually focused on three factors: the level of education, its accessibility, and intellectual ability. However, far less attention is given to more fundamental—though less obvious—drivers: place and time of birth. These two factors determine the economic environment in which a person grows up, makes their first financial decisions, and forms their worldview. Yet even these conditions can be outweighed by an even more powerful force: the level of inflation and its duration. Inflation directly affects purchasing power, the ability to accumulate capital, and overall financial behavior, shaping when and to what extent a person is willing to take investment risk.

This is where we need to take a step back and look at history more broadly. Inflation is not just an economic indicator that rises or falls. It is a force that sets the tempo of development for entire generations. Living in a stable economy versus a prolonged inflationary environment creates different financial habits, different levels of trust in institutions, and fundamentally different approaches to investing.



Source: S&P 500 annual inflation vs CPI (1964–2024) | **Isabelnet**

Below are historical data comparing U.S. inflation with the S&P 500 index over the period from 1964 to 2020. The S&P 500 includes the stocks of 500 of the largest U.S. companies by market capitalization, making it a key

benchmark of the market. The chart highlights two distinct periods: the first characterized by prolonged high inflation—averaging above 10%—and the second by a low-inflation environment averaging up to 2%.

Imagine you were born in the 1960s. Your youth coincided with a period of strong inflationary pressure. Prices were rising rapidly, money was losing purchasing power, and investments failed to deliver meaningful returns. As the chart shows, the S&P 500 remained largely range-bound for an extended period, meaning that even well-chosen assets struggled to offset inflation losses.

Now imagine a completely different life. You are born in the 1970s and enter adulthood in a different economic era. Inflation, which had previously eroded savings, gradually subsides. In the 1980s it slows down, and after 1990 the markets seem to find a new momentum—ushering in a long period of index growth.

In such an environment, even conservative investment decisions begin to work. Money no longer escapes you—it starts to accumulate. The market moves upward slowly but steadily, and the S&P 500 builds consistent positive momentum year after year. Investing shifts from a struggle for preservation into a tool for wealth creation.

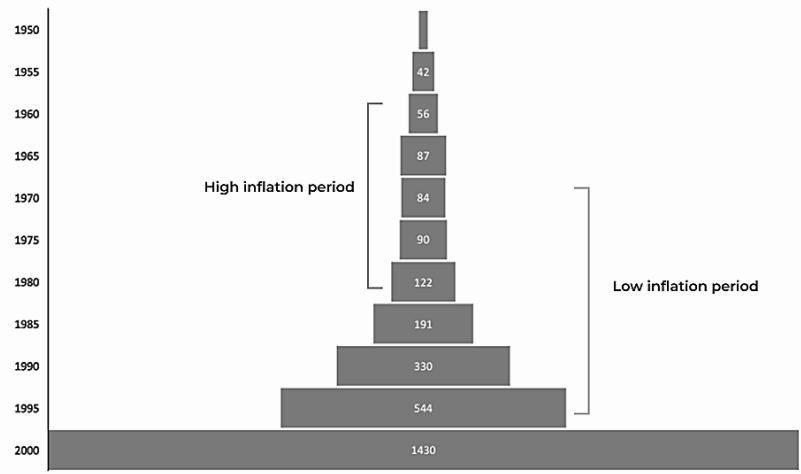


Chart: S&P 500 historical returns & inflation-adjusted performance |(1950–2024)

This is where the key generational difference becomes visible. Some were forced to constantly chase inflation just to protect their money, while others were given the opportunity to grow alongside the market. The chart below clearly illustrates how decisive the starting point is—it shows how many times the S&P 500 grew depending on the economic reality an investor entered.

The generation that lived through the 1990s in Ukraine was shaped by deep economic shocks. Hyperinflation, sharp currency devaluation, mass erosion of savings, and chaotic market reforms significantly undermined trust in the financial system. In a short period of time, many families lost decades of accumulated wealth—not due to personal mistakes but due to a nationwide economic restructuring and the collapse of old institutions.

For members of this generation, money ceased to be an abstract numerical value. It became a symbol of security and stability that had to be protected. This formed a distinctive financial mindset: caution, pragmatism, distrust of banks, fear of risk, and a preference for tangible assets—cash, real estate, and physical goods.

This experience left a deep imprint that still influences the financial behavior of millions of people today. Even now, many individuals from this generation prefer minimal risk, avoid equity markets, remain sceptical of investment opportunities and are cautious toward new technological instruments. Their lived experience shaped the belief that financial stability is fragile and that money can disappear not only due to poor decisions but also due to external shocks.

Financial decisions are always shaped by life experience, available information, and perception of reality. Economic conditions create fundamentally different approaches to money, which explains why the same actions can produce very different outcomes depending on context—in this case, inflation.

Those who began investing during periods of high inflation typically faced limited asset growth, while investors in stable economic periods achieved significantly higher returns.

Some may point out that central bank interest rates also play an important role. And indeed, they do. However, the key insight is that interest rate increases are usually a consequence of high inflation. When prices rise too quickly, governments raise key rates to cool down the economy. Higher rates make borrowing more expensive, reduce economic activity, and restrict investment, while lower rates stimulate growth and support capital accumulation.

This highlights the importance of understanding macroeconomic context, analyzing key market drivers, and choosing the right timing for investment. However, it is not necessary to track dozens of macroeconomic indicators—focusing on inflation alone is often sufficient. In my view, it is the primary indicator that reflects the overall state of the economy and provides a long-term signal for financial decision-making.

It is especially important to be critical when interpreting inflation data, as governments may influence reported figures. Real inflation, however, is visible everywhere: food prices, fuel prices, and technology prices—there are where the true inflation rate becomes evident and where attention should be directed.

Part IV: Riding the Wave of Low Inflation

To be candid, there is one person who truly inspires me as an investor—above all, through his approach to investing, grounded in patience, long-term thinking, and a life philosophy of simplicity. His story clearly demonstrates how the combination of geographic, temporal, and economic factors can create unique conditions for exceptional success. In this example, it is especially important to focus on the favorable economic environment that coincided with the moment of his birth and allowed him to fully capitalize on available opportunities. In a different economic context, the same actions might have produced far more modest results.

Warren Buffett was born in 1930 in Omaha, Nebraska, USA. His formative years took place in the period following the Great Depression and World War II. This era was characterized by economic recovery, rising productivity, and the establishment of stable financial institutions—together creating highly favorable conditions for long-term investing.

Buffett's interest in finance emerged early in childhood. At the age of 11, he made his first investment, purchasing three shares of Cities Service at $38 each. Initially, the price dropped to $27 but later rose to $42, at which point he sold the shares for a small profit. In later years, Buffett often reflected on this decision with regret, as the stock continued to rise significantly. This early experience became a foundational lesson that shaped his investment philosophy: hold high-quality assets for the long term and allow compounding to work in your favor.

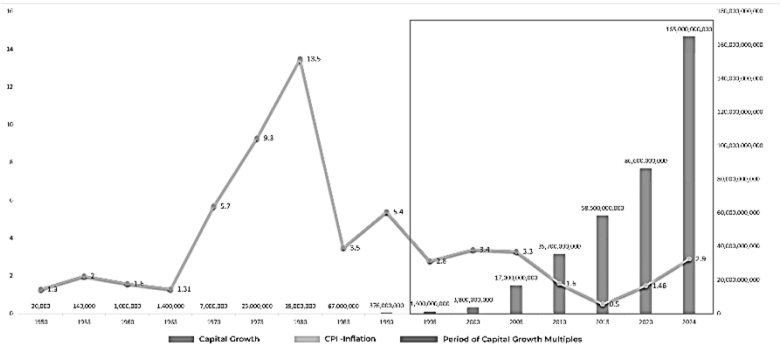


Chart: Net Worth Growth vs. Inflation | (1950–2024)

Historical data on Buffett's capital growth reveals a critical pattern. The first truly significant results only became visible after the age of fifty. Prior to that, he steadily and consistently built his capital but it was beyond this milestone that his wealth began to grow exponentially.

After 1985, when Buffett turned 55, his capital had already reached hundreds of millions of dollars—approximately $376 million. This is where the chart becomes particularly insightful, especially when viewed alongside inflation dynamics. It is no coincidence that this period marked the beginning of accelerated capital growth, which later took on an exponential trajectory.

When analyzing this growth, it is useful to highlight the five-year period of sharply declining inflation. Between 1980 and 1985, inflation in the United States fell more than threefold—from 13.5% to approximately 3.5%. During the same period, Buffett's personal net worth increased from $19 million to $67 million. This was only the initial surge—the full effect of declining inflation became evident as low inflation persisted over the following decade.

From 1995 to 2024, average annual inflation remained within the 2–3% range. Over these three decades, highlighted in the chart, Buffett's wealth grew at an extraordinary pace, ultimately reaching approximately $165 billion.

Berkshire Hathaway, the investment company where Buffett serves as Chairman and CEO, executed a major reduction of holdings in several publicly traded companies in the second half of 2024. As a result, the company realized a historic profit of $325 billion—an all-time record—and reached the highest level of cash reserves in its history.

The key takeaway is simple yet powerful: time is the most critical factor in capital growth. Buffett started early and had decades to invest, allowing compound interest to work in his favor and drive exponential growth.

Modern investors don't need to chase quick wins or attempt to replicate someone else's path. It is enough to apply this principle in your own life—a long-term investment horizon and patience can deliver far greater results than short-term speculation or impulsive decisions.

Crisis as Opportunity

The newly elected 47th President of the United States has just introduced sweeping trade tariffs affecting virtually every country in the world. As an observer of the global economic stage, I can see how the stock market reacts instantly—and many are already calling this the beginning of a new global crisis.

The situation is unfolding rapidly. The market is losing billions of dollars every hour. Major indices—S&P 500, Nasdaq Composite, and Dow Jones Industrial Average—have dropped between 10% and 20% within just a few days. Daily losses across sectors such as technology, finance, digital services, industrials, and energy averaged around 5%, creating a true atmosphere of panic. In total, the market lost approximately $10 trillion in capitalization over this short period.

It's worth recalling the words of Warren Buffett from his 2008 article in The New York Times: *"Buy American. I Am."* He emphasized that the United States had endured numerous crises throughout the 20th century—two world wars, the Great Depression, recessions, and financial shocks. And yet, the Dow Jones index rose from 66 to 11,497 points, demonstrating the power of long-term growth even after extended periods of instability.

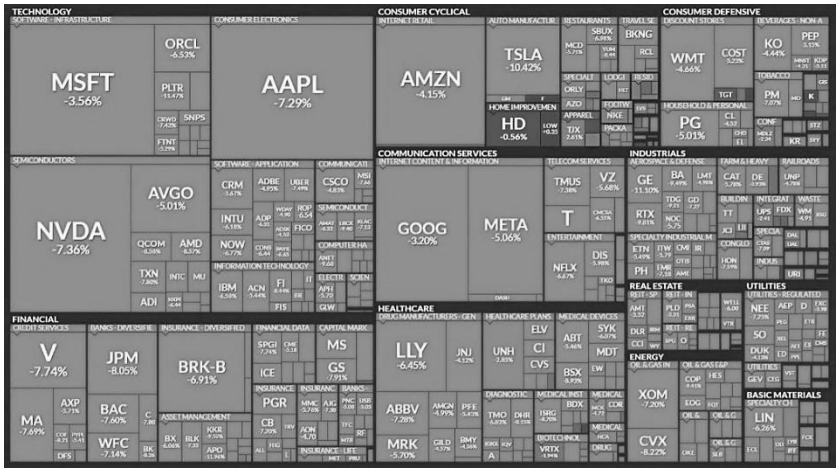


Chart: Stock Market Decline | April 6, 2025

To clearly see how this disciplined perspective plays out in practice, it's enough to look at the market just a few days after the panic-driven sell-off.

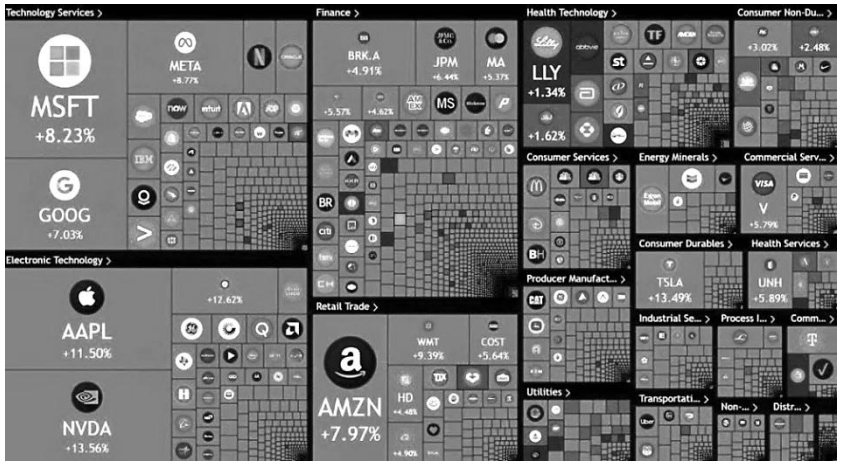


Chart: Stock Market Recovery | April 9, 2025

By April 9, 2025, major indices had already rebounded by approximately 12%. This short time frame illustrates a crucial principle: even after large-scale disruptions, there are always opportunities to enter the market or gradually build positions—often against the backdrop of widespread crisis narratives.

1. Understanding Cyclicality: 80-Year Cycles and 20-Year Phases

New generations initiate a new 80-year cycle starting with the "High" phase, as they are the primary drivers of change across society, the economy, and technology. It's essential to recognize where we are today: at the final stage of the previous 80-year cycle, in the "Crisis" phase. This is precisely what creates unique opportunities for those prepared to act with discipline and a long-term perspective.

2. Avoiding Noise and Focusing on What Matters

All crises are temporary. Excessive exposure to news, forecasts, and market commentary often amplifies emotional reactions and distracts from what truly matters. The key to success lies in maintaining focus on the fundamental factors that genuinely influence investment decisions.

3. Building a Long-Term Investment Strategy

Sharp market downturns during crises create opportunities to acquire high-quality assets that can form the foundation of a long-term portfolio. A favorable macro condition for such investments is a low-inflation environment, which helps preserve purchasing power and supports long-term asset stability.

4. "The Market Is a Mechanism for Transferring Money from the Impatient to the Patient"

As famously stated by Warren Buffett, those who panic and sell during downturns effectively transfer their opportunities to more patient investors. Discipline, patience, and a long-term mindset are what allow investors to fully capitalize on periods of crisis and compound their capital over time.

2

CHAPTER

Fundamentals of Digital Assets

"A proper understanding of cryptocurrencies begins with mastering the core terminology, and then gradually moving toward blockchain technology—the foundation of all digital assets. Newcomers to the crypto space often hear about Bitcoin and cryptocurrencies without truly understanding what stands behind these concepts."

In this chapter, we will set aside the secondary details and focus on the key concepts and mechanisms that form the backbone of the entire digital asset and cryptocurrency ecosystem. You will gain a clear understanding of what blockchain is and how it works, how mining functions and why halving events can influence the market, as well as the role of smart contracts and the problems they are designed to solve.

Grasping these fundamental mechanisms will help you build a comprehensive understanding of how digital assets are structured and the role they play across different layers of the financial and technological system. The goal of this chapter is to establish a solid foundation for your continued exploration of digital assets and the underlying technologies that drive their value, resilience, and long-term potential.

Part I: Digital Assets

Digital assets are any form of value that exists exclusively in digital form and can be owned, transferred, stored, or used as a means of payment or investment. They operate within decentralized or centralized digital systems and are typically built on blockchain technology—a distributed digital ledger that ensures transparency, security, and immutability of data.

Unlike physical assets such as gold or real estate, digital assets have no tangible form, yet they can carry real financial or functional value. In many ways, they are similar to equities in the stock market—they exist purely in digital form and are recorded in electronic ledgers.

The term *digital assets* is broad and includes several key categories:

Coins—These are native assets that operate on their own independent blockchain networks. Their primary purpose is to serve as a medium of exchange, a store of value, or a digital form of money.

Tokens—Assets created on existing blockchain networks. They do not have their own blockchain but instead rely on another platform to function or to perform specific use cases. Examples include Uniswap (UNI), DAI, and Tether (USDT), which are built on the Ethereum network.

NFTs (Non-Fungible Tokens)—A specialized type of token. Unlike standard tokens, which are fungible and interchangeable, NFTs are unique and non-interchangeable. They are commonly used to verify ownership and authenticity of digital items such as artwork, collectibles, and music.

Stablecoins—Digital assets pegged to the value of a real-world asset or another cryptocurrency, most commonly the US dollar. Popular examples include USDC, USDT, and DAI.

Central Bank Digital Currencies (CBDCs)—Centralized digital currencies issued and controlled by a country's monetary authority or government. CBDCs represent official fiat currency in a digital format.

Part II: Blockchain Technology

As we know, the first practical implementation of blockchain technology was the Bitcoin network, launched in 2009. This innovation marked the beginning of a new era of digital interaction—one where control and trust are distributed among network participants rather than concentrated in centralized institutions.

Blockchain is a distributed database shared across multiple participants within a network. Data is not stored in a single central location but across many computers worldwide. This architecture ensures transparency, security, and immutability.

Imagine a ledger or record book where every entry is timestamped and cannot be erased—that's essentially how blockchain works.
Blockchain systems can have different architectures:

- Public
- Private
- Hybrid

In addition, various consensus mechanisms determine how participants agree on changes to the data. This flexibility allows each crypto project to be uniquely designed to solve specific problems and meet particular needs.

Core Components of Blockchain

Blockchain technology is built on six key components that ensure its reliability, security, and efficiency:

- **Distributed Ledger Technology (DLT)**

A distributed ledger allows data to be stored simultaneously across multiple computers worldwide. This makes the system resilient to attacks and node failures. Even if some nodes go offline, others maintain copies of the data, ensuring uninterrupted operation.

Imagine storing all transactions on a single server—if it gets compromised, the data is lost. In blockchain, data is replicated across

numerous nodes globally, providing redundancy and strong protection against data loss.

- **Public-Key Cryptography**

Cryptography ensures the confidentiality and authenticity of transactions. A private key remains with the owner and is used to sign transactions, verifying their legitimacy. A public key acts as an address to receive funds or assets. Importantly, the private key cannot be derived from the public key.

For example, when you receive Bitcoin, you are given a public address. To prove ownership, you sign transactions using your private key.

- **Consensus Mechanism**

Consensus ensures that all network participants agree on which transactions are valid. The most common mechanisms are **Proof of Work (PoW)** and **Proof of Stake (PoS)**.

PoW requires significant computational power to solve complex mathematical problems. In Bitcoin, miners perform these computations to validate transactions and add new blocks.

PoS selects validators based on the amount of cryptocurrency they hold and are willing to stake. In Ethereum, validators create new blocks proportionally to their stake in the network.

- **Decentralization**

Decentralization means that no single entity controls the entire system. Decisions are made collectively by network participants. This reduces the risk of censorship or manipulation, as no central authority can alter transactions.

For example, when you transfer cryptocurrency, there is no need for a bank or intermediary—the network of distributed nodes verifies the transaction.

- **Smart Contracts**

Smart contracts are self-executing programs that automatically enforce the terms of an agreement. They operate based on predefined rules and do not

require third-party involvement. This reduces fraud risk and increases efficiency.

For instance, when purchasing real estate through a smart contract, ownership can be transferred automatically once all conditions—such as payment—are met.

- **Immutability of Records**

Data recorded on the blockchain cannot be altered or deleted without modifying all subsequent blocks—an almost impossible task. This ensures a high level of protection against tampering.

For example, if someone attempts to alter transaction data (such as withdrawing funds fraudulently), the inconsistency would immediately be detected due to cryptographic hashes linking each block.

Understanding these components provides a solid foundation for grasping how blockchain systems operate and why they are considered one of the most transformative innovations in modern finance and technology.

Blockchain Consensus Mechanisms

The most critical element that ensures the integrity and operational logic of any blockchain network is its chosen consensus mechanism. It determines how participants agree on which transactions are valid and how new blocks are added to the chain. This choice directly impacts not only the efficiency of the network but also the emergence of key processes such as mining, halving, validation, and staking.

In networks based on **Proof of Work (PoW)**, mining plays a central role. Mining is the process of solving complex computational problems required to add new blocks to the blockchain. Alongside mining, there is halving—a periodic reduction in block rewards designed to control inflation and support long-term network stability. Blockchains such as Bitcoin, Litecoin, and Dash are built on Proof of Work.

In **Proof of Stake (PoS)** systems, the logic differs significantly. Transactions are confirmed through validation, and the right to create new blocks is assigned proportionally to a participant's stake in the network.

This approach dramatically reduces energy consumption and improves efficiency. A key component of PoS is staking—the process of locking up assets to participate in transaction validation and network security. Today, Ethereum (after its transition), Polkadot, and Cardano utilize Proof of Stake.

Ultimately, the consensus mechanism defines not only the technical architecture of a blockchain but also its economic model. It determines how the network scales, defends against attacks, and maintains long-term stability. Understanding consensus principles provides insight not just into individual cryptocurrencies but into the logic of the entire blockchain ecosystem.

Proof of Work (PoW): Mining and Halving

Mining and halving are two fundamental components of the Proof of Work consensus mechanism, first implemented in the Bitcoin network. They are deeply interconnected and together ensure the security, stability, and long-term sustainability of the system. Bitcoin provides the clearest real-world example of how these mechanisms operate.

Mining is the process by which network participants—miners—perform complex computations to solve mathematical problems. These problems are essential for validating transactions and adding new blocks to the blockchain. Miners compete with one another using specialized hardware and significant amounts of electricity to be the first to find the correct hash for a new block.

Each new block contains transaction data for a given period and is cryptographically linked to the previous block, forming a continuous chain—blockchain. In PoW systems, the principle of "first to solve" applies: only the miner who successfully solves the problem first earns the right to add the block and receive the reward.

This model serves several critical functions:

- It incentivizes participants to maintain and secure the network
- It makes the system highly resistant to attacks—altering data would require recalculating all subsequent blocks faster than the

entire network combined, which is practically impossible due to the enormous computational cost.

Halving is a programmed event in PoW blockchains where the reward for creating a new block is reduced by half. Its primary purpose is to control the issuance of new coins and protect the system from excessive inflation.

With each halving, fewer new coins enter circulation. This gradually slows supply growth and introduces a deflationary dynamic. Unlike traditional financial systems, where money supply can expand with few constraints, blockchain rules are embedded in code and remain consistent over time.

How the Bitcoin Network Works

The Proof of Work mechanism in the Bitcoin network is designed so that a new block is created approximately every 10 minutes. This is the average time required for a miner to solve the computational challenge, add a block, and receive a reward.

This interval is maintained through an automatic difficulty adjustment mechanism, which recalibrates the complexity of mining tasks based on the total computational power of the network. Difficulty is adjusted roughly every two weeks, or every 2,016 blocks, ensuring a consistent operational rhythm regardless of the number of miners.

Halving occurs every 210,000 blocks—approximately once every four years. During each halving event, the block reward is reduced by half:

- 2009 — 50 BTC per block
- 2012 — 25 BTC
- 2016 — 12,5 BTC
- 2020 — 6,25 BTC
- 2024 — 3,125 BTC

This mechanism steadily reduces the rate of new coin issuance and controls inflation within the Bitcoin network. The supply of new bitcoins entering circulation continuously declines—a rule embedded in the protocol since its inception.

Halving also forces miners to adapt—seeking more efficient technologies and optimizing operational costs to remain profitable over the long term.

Over time, the role of mining as the primary source of new bitcoins will diminish. Transaction fees will gradually become the main incentive for network participants, allowing Bitcoin to transition from an issuance-driven system to a mature, self-sustaining financial network capable of maintaining stability for decades.

The PoS Mechanism – Staking, Validators, and Smart Contracts

Networks that operate on Proof of Stake (PoS) use a mechanism called staking instead of energy-intensive mining. In this process, participants (validators) lock a certain amount of cryptocurrency into a smart contract. In return, they gain the right to verify transactions and add new blocks to the blockchain, earning rewards for their participation.

This way, network security is maintained through the economic incentives of participants rather than through electricity consumption.

The first network to implement Proof of Stake was Peercoin in 2012. However, this mechanism gained real mainstream recognition much later, when Ethereum fully transitioned to PoS in 2022. This move significantly reduced the network's energy consumption and made it more resistant to centralization, opening a new chapter in blockchain infrastructure development.

Staking can be viewed as a form of trust in the network. A user voluntarily locks their coins for a certain period to become a candidate validator. The larger the stake, the higher the chances of being selected to participate in block production. At the same time, many networks also take into account validator reputation or use pseudo-random selection mechanisms, which improves fairness and reduces the risk of power concentration.

Validation is the core process in Proof of Stake. One validator proposes a new block, while others verify its correctness. If the majority of participants confirm that the data is valid, the block is added to the chain

and validators receive rewards. Compared to Proof of Work, this approach requires significantly fewer resources and allows the network to scale more efficiently.

Smart contracts play a key role in staking. They hold validators' assets as collateral, distribute rewards, and automatically apply penalties to dishonest participants. If a validator violates network rules, their stake can be partially or fully slashed (confiscated).

This model creates strong economic incentives to act honestly and maintain network stability, ensures efficient scalability, and significantly reduces energy consumption compared to Proof of Work.

The Algorithm of the Ethereum Network

New blocks in the network are created approximately every twelve seconds. Users initiate transactions, which first enter the **mempool**—a queue of unconfirmed operations. When a sufficient number of transactions accumulates, the network moves on to forming a new block.

Ethereum uses a pseudo-random selection algorithm to choose a validator from participants who have staked at least 32 ETH. The selection process takes into account the size of the stake, the validator's activity, and their reputation. This means that even under similar conditions, different participants may be granted the right to produce blocks at different times.

The selected validator constructs a new block from transactions waiting in the mempool and executes them using the **Ethereum Virtual Machine (EVM)**, which verifies all parameters, conditions, and digital signatures associated with each transaction. After that, other validators independently verify the block and vote on its acceptance. If the majority agrees, the block is officially added to the blockchain.

The validator's reward consists of a portion of transaction fees and additional incentives for block production. The reward size depends on the amount of ETH staked and overall network activity. Validators who help confirm the block also get rewards, though the amounts are smaller.

In the first half of 2025, Ethereum is scheduled to implement the **Pectra upgrade**, which will increase the maximum effective validator balance

from 32 ETH to 2048 ETH. This may significantly impact the staking structure and the economics of network participation.

Other Consensus Mechanisms

Delegated Proof of Stake (DPoS) allows users to vote for delegates who create blocks on behalf of the network. This improves speed but reduces the number of direct participants. DPoS is used in networks such as EOS, TRON, and STEEM.

Proof of Authority (PoA) is based on reputation. Only designated validators, trusted by the network, are allowed to produce blocks. This mechanism is fast and energy-efficient but more centralized, so it is typically used in private or enterprise blockchain systems.

Practical Byzantine Fault Tolerance (PBFT) ensures network resilience even in the presence of failures or attacks. Block confirmation requires agreement from at least two-thirds of participants. This approach is well-suited for permissioned networks such as Hyperledger Fabric, Ripple, and Zilliqa.

Types of Blockchain

The architecture of a blockchain defines how a network operates, who has access to it, and how decisions are made. Today, there are several main types of blockchain architectures, each designed to solve specific problems and each with its own strengths and limitations.

Public blockchains are open networks that anyone can join. Users are able to perform transactions, view all records, and participate in consensus by acting as full network nodes. This model forms the foundation of blockchains such as Bitcoin and Ethereum. It provides maximum transparency and decentralization but may sacrifice speed and scalability.

Private blockchains operate on the opposite principle. Access is restricted, and control is centralized in the hands of pre-approved participants. These networks are often used by companies or organizations for internal processes where confidentiality, data processing speed, and

access control are critical. The trade-off is a significantly lower level of decentralization.

Hybrid blockchains combine elements of both public and private systems. Some data or functions may be open to everyone, while others remain accessible only to a restricted group of participants. This approach allows for a balance between transparency and privacy and works well for business models that operate with both public and sensitive data simultaneously.

Consortium blockchains are governed not by a single organization but by a group of participants. Control is distributed among several companies or institutions, such as banks or industry alliances. This model is often used where a shared infrastructure is needed among multiple major players but without full public openness.

To summarize the differences between the main types of blockchain architecture, it is useful to view them in a comparative format.

TYPE	ACCESS	ADVANTAGES	LIMITATION	EXAMPLE
Public	Open	Transparency, Security	Speed	Bitcoin Ethereum
Private	Restricted	Speed, Control	Transparency	Hyperledger Ripple
Hybrid	Combined	Flexibility	Complex structure	IBM Food Trust
Complex structure	Restricted	Shared control	Coordination complexity	Hedera Stellar

Table: Blockchain Architecture Comparison

This table highlights who has access to the network, where each type is used in practice, and what advantages and limitations it brings. The following diagram further summarizes the key characteristics of public, private, hybrid, and consortium blockchains, helping reinforce the material and explain why different architectures coexist to solve different problems.

It is important to note that blockchain technology is constantly evolving and adapting to different use cases. There is no universally "best" or "worst"

type of blockchain—the effectiveness of each depends entirely on the specific goal, requirements for privacy, speed, scale, and transparency. Every project selects the architecture that best aligns with its objectives and intended application.

Key Advantages of Blockchain

After exploring the fundamentals of blockchain and how it works, it's time to look at the real-world advantages it brings to individuals and businesses. These benefits go far beyond theory—they are already reshaping how we interact with finance, data, and digital assets.

- **Security**

Blockchain protects your data and assets through cryptography and the absence of a central point of control. Every transaction is encrypted and linked to the previous one, making the system extremely resistant to fraud.

For you, this means peace of mind—your data and funds remain protected from malicious actors and cyberattacks, and the likelihood of abuse is significantly lower than in traditional centralized systems.

- **Decentralization**

Blockchain distributes information across a network of computers, removing the need for intermediaries and centralized authorities. No single person or organization has full control.

This means less censorship, less corruption, and greater transparency. You gain direct control over your data and transactions, creating a fairer digital environment.

- **Transparency**

Every transaction validated by the network is recorded in a public ledger. This makes it possible to track all activity, and it is nearly impossible to alter information without the awareness of other participants.

For companies and governments, this increases accountability. For you, it builds trust in the operations you engage in.

- **Privacy**

Blockchain combines transparency with privacy. Your transactions are visible on the network but identities remain protected through pseudonyms or public keys.

Technologies such as zero-knowledge proofs allow transactions to be verified without revealing underlying data. Private blockchains also provide controlled access, which is essential for enterprise use cases.

Ultimately, blockchain respects your privacy and limits the intrusive data collection often seen in centralized institutions.

- **Speed and Cost Efficiency**

Amid ongoing debates around the scalability trilemma, it becomes clear that public blockchains currently lag in terms of speed and cost efficiency. However, private and hybrid blockchains are already leveraging the technology to enable fast and cost-effective transactions.

Unlike public blockchains such as Bitcoin and Ethereum, which face inherent scaling limitations, these networks can adjust block size and production speed to enable near-instant transfers with minimal fees. This avoids delays and costs associated with traditional systems like SWIFT, which rely on multiple intermediaries.

While private and hybrid chains may sometimes compromise on security or decentralization, they significantly reduce intermediaries, pushing the boundaries of blockchain efficiency. As the industry evolves, these innovations also lay the groundwork for public blockchains to catch up—ultimately helping address the blockchain trilemma by balancing scalability, security, and decentralization for the broader ecosystem.

- **Tokenization**

Blockchain enables real-world assets to be converted into digital forms, or tokens. This makes ownership transfer faster and cheaper, increases liquidity, and opens new investment opportunities.

Assets such as real estate, art, intellectual property, and financial instruments can all be tokenized.

- **Financial Accessibility**

Blockchain opens financial services to hundreds of millions of people, especially those in remote regions without access to traditional banking systems. It operates independently of trust or bias, allowing individuals to access financial tools without barriers.

- **Smart Contracts and dApps**

As mentioned earlier, smart contracts and decentralized applications (dApps) are transformative components of blockchain technology, offering unprecedented autonomy and control to both developers and users.
Built-in automation reduces reliance on intermediaries, which often leads to lower costs while also minimizing the risks of manipulation, fraud, and human error.

Smart contracts and dApps typically run on Layer 1 blockchains (base-layer networks), ensuring resistance to censorship and external control. This expands user freedom and guarantees access and interaction with applications under virtually any circumstances.

Additionally, without centralized authorities, developers can avoid the high fees typically charged by traditional app stores and platform ecosystems.

Blockchain as the Foundation of Digital Assets

In the digital age, blockchain and cryptocurrencies are often mentioned in the same context, as if they were the same thing. This confusion is completely understandable but it also prevents a clear understanding of their true value. To fully grasp the real potential of these technologies, it is important to clearly separate their roles and functions in the modern digital world.

Blockchain is the underlying technology, while digital assets—cryptocurrencies in particular—are one of its practical applications. When they work together, blockchain serves as the infrastructure on which the entire system is built. It ensures data storage, transaction verification, and network integrity. Every operation involving digital assets is recorded in a

block and added to a continuously growing chain of data, which is simultaneously stored across thousands of computers around the world.

This structure makes the system both transparent and extremely resistant to tampering. The decentralized nature of blockchain means that no single individual or organization has full control over the network, significantly reducing the risks of fraud, manipulation, and technical failures. For users, this translates into a higher level of security, trust, and stability—even on a global scale.

Understanding this relationship reveals a broader picture: cryptocurrencies do not exist in isolation. Their value and functionality are directly dependent on blockchain, which ensures the accuracy, immutability, and transparency of all transactions.

Part III: Cryptocurrencies

After getting familiar with digital assets and the fundamentals of blockchain technology, it's time to take an important next step and understand the core difference between coins and tokens. These terms are often used side by side, and sometimes even grouped under the umbrella term altcoins, which only adds to the confusion. In reality, they are not interchangeable—each has a distinct meaning within the crypto ecosystem. Understanding this difference will help you navigate digital assets more effectively and better grasp how different blockchain projects are structured and what opportunities they create for users.

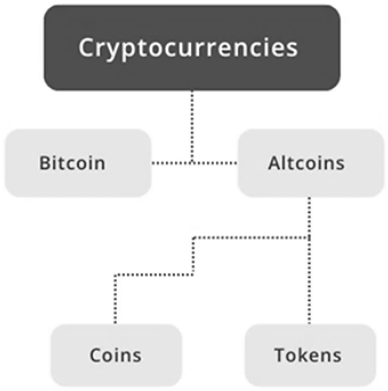


Diagram: Components of Cryptocurrencies

Coins are digital currencies that operate on their own native blockchain. They perform the basic functions of money within a network: acting as a medium of exchange, a store of value, and a means of paying transaction fees. Classic examples include Bitcoin, Ethereum, and Litecoin.

Tokens, in contrast, do not have their own blockchain. They are created on top of existing networks and form part of broader ecosystems. Tokens are used in decentralized applications (dApps), DeFi platforms, NFT projects, and other services where they serve functional or financial roles. Well-known examples include USDT, Uniswap, and Chainlink.

Altcoins refer to all cryptocurrencies other than Bitcoin. This category includes both coins with their own blockchains and tokens built on existing platforms.

Understanding this structure significantly simplifies working with digital assets. It allows you to quickly assess the maturity of projects, pay

attention to whether they have their own blockchain, choose crypto wallets more effectively, and clearly understand how transactions actually take place.

Past IV: Web3

After exploring the fundamentals of digital assets, blockchain, tokens, cryptocurrencies, and altcoins, it is logical to take one more step back and look at the bigger picture. All these elements do not exist in isolation—they come together to form a unified ecosystem that shapes a new model of digital interaction. This model is commonly referred to as **Web3**—an internet that is gradually building the economy of the future.

Web3 is an evolutionary stage of the internet, built on the core idea of decentralization. In the Web2 world, control over data, platforms, and financial flows is concentrated in the hands of large corporations. Web3, however, fundamentally changes the concept of digital ownership. Here, users gain real control over their assets, personal data, and participation in the governance of online environments.

In this model, traditional intermediaries are no longer required. Trust and transparency are ensured by blockchain, while each user independently manages their wallet, digital identity, and interactions with platforms. You are no longer just using services—you are effectively owning a share of the digital space you participate in.

Web3 vs Web2

It is important to understand that Web3 is not only a technological shift but also a philosophical transformation of the internet. In this system, every participant stops being a passive consumer of content and becomes an active co-creator and co-owner of the digital environment being built collectively.

To better understand the difference between Web2 and Web3, it is useful to examine the key elements of the digital environment. This is not only about technology but also about who owns the data, who controls financial flows, and how a user's digital identity is formed.

This environment creates an open economy where transparency, accountability, and long-term incentives become the foundation of trust. As a result, power is redistributed from centralized platforms to decentralized networks governed by their users. This shift also enables new

forms of digital coordination, such as DAOs, where decisions are made collectively rather than imposed from the top down. Ultimately, Web3 aims to create a more equitable and user-driven internet where value is shared more fairly among all participants.

Below is a comparison of the two web generations.

COMPONENT	WEB 2.0	WEB 3.0
Data	Stored centrally	Stored in a decentralized manner
Ownership	Data belongs to platforms	Data and assets belong to the user
Payments	Through banks and payment processors	Through cryptocurrencies and wallets
Governance	Companies make decisions	DAOs and smart contracts

Table: Comparison of Web 2.0 and Web 3.0

This is where new mechanisms of collaboration, investment, and governance are being formed, reshaping the way we understand digital markets. Web3 is not an abstract idea of a distant future—it is a reality already unfolding today.

1. **Own Blockchain and Network**

Coins operate on their own native blockchain and have an independent network that handles transaction processing and ecosystem support. Tokens, on the other hand, exist on top of external networks and rely on shared blockchain infrastructure resources.

2. **Functionality**

Cryptocurrencies with their own blockchain independently power their transaction systems and ecosystem operations. Most modern tokens function exclusively through smart contracts, relying on the infrastructure of third-party blockchain networks.

3. Consensus Mechanism

Native blockchains use consensus mechanisms such as Proof of Work, Proof of Stake, or Delegated Proof of Stake to ensure security and decentralization. Tokens inherit the consensus model of the underlying blockchain on which the project is built.

4. Type of Blockchain

Some networks are open and public, while others are private or hybrid—everything depends on the goals of the project. Tokens can exist on any of these blockchain types.

5. **Understanding Altcoins**

Altcoins include all cryptocurrencies except Bitcoin. They can be either assets with their own independent networks or tokens built on existing platforms, each with different consensus mechanisms and blockchain architectures.

3

CHAPTER

Infrastructure of Digital Assets

"Now it's time to step inside. Every building has walls, floors, rooms, and internal systems—different ecosystems, infrastructure layers, projects, wallets, exchanges, and mechanisms that keep the digital world alive."

Imagine a blockchain as a multi-story digital building. Its foundation is already in place—we've explored blockchain, cryptocurrencies, tokens, NFTs, and the key mechanisms behind how they work. But on top of this foundation, a much more complex structure is built: a fully developed ecosystem of digital assets.

This ecosystem consists of multiple layers, each serving its own role. It includes base blockchain networks, scaling solutions, and cross-chain interoperability systems, as well as the everyday applications users interact with—wallets, exchanges, DeFi platforms, and NFT marketplaces.

In this chapter, you will understand how this multi-layered structure works together to form the infrastructure of blockchain ecosystems, how the different layers interact with one another, and why this architecture is what enables the stability, scalability, and continuous growth of the digital economy.

Part I: Digital Infrastructure of the Ecosystem

Blockchain networks are required to operate in an environment without central authority or a single controlling entity. Because of this, the security requirements are extremely high. All functions within such a system are carried out by technical components—nodes, smart contracts, and consensus algorithms—which together ensure the decentralized nature of the network.

At the same time, a blockchain must remain scalable. As the number of users, transactions, and data exchanges grows, network load continuously increases. If the system cannot adapt to this growth in time, it loses efficiency and practical value.

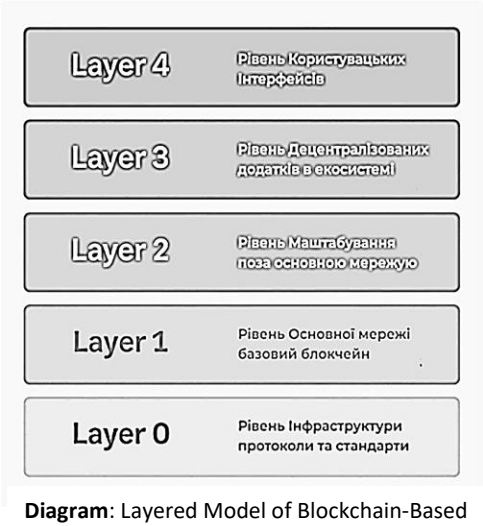


Diagram: Layered Model of Blockchain-Based Ecosystem Architecture

This is precisely why a multi-layer blockchain architecture was created—to combine security, decentralization, and scalability within a single system. Each layer performs its own function, enhancing the overall performance of the network and enabling interaction between different blockchain ecosystems. This approach makes it possible to maintain a high level of security without sacrificing speed or usability.

Now that we have established a basic understanding of the layered blockchain concept, it is time to take a closer look at each level in detail. For clarity, this architecture can be visualized as a sequence of layers—from foundational infrastructure to user-facing interfaces—each playing a distinct role in the ecosystem's operation.

Step by step, we will explore their functionality and learn how to identify which layer different crypto projects belong to.

Layer 0 – Interoperability Infrastructure

For clarity, Layer 0 can be understood as a combination of two essential components—both of which are critical for the existence of any blockchain network.

The hardware component forms the physical foundation of blockchains. This includes real-world devices that power the network: computers, servers, specialized mining machines such as ASIC miners, and distributed data centers. This infrastructure ensures the stability of large-scale networks and allows blockchain ecosystems to operate continuously.

The technological component includes internet connectivity, communication protocols, cross-chain bridges, and messaging standards. This layer is responsible for the functionality and innovation of the blockchain environment. It enables different networks to integrate with one another while remaining compatible and interoperable.

In the context of blockchain, it's important to understand that every network relies on physical infrastructure—a distributed system of servers, computers, or mining devices. At the same time, not all Layer 0 projects directly build this physical layer. Many operate at the level of software protocols and standards. Instead of running their own servers or mining farms, they develop technologies that allow different blockchains to securely connect, exchange data and assets, and function as a unified system.

To better understand how Layer 0 works in practice, it's useful to move beyond theory and examine its functional capabilities. This layer serves both as a foundation for launching new blockchain networks and as an environment for their interaction. It provides tools that enable rapid deployment of new blockchains, seamless transfer of assets and data between networks, and the unification of separate ecosystems into a single interconnected space.

However, these capabilities also come with challenges. Integrating multiple networks requires complex technical solutions, and cross-chain data exchange increases security demands. Additionally, the lack of unified standards often complicates long-term scalability across ecosystems.

FUNCTIONS	ADVANTAGES	LIMITATIONS	EXAMPLES
Hardware infrastructure for rapid deployment of new blockchains			
Environment for building new blockchain networks	Transfer of assets and data across networks	Integration complexity	Cosmos
Unification of multiple networks into a single ecosystem	Flexibility	Elevated security risks in cross-chain data exchange	Avalanche
Scalability of the blockchain ecosystem	Rapid deployment enabled by ready-made infrastructure	Lask of standardization	Polkadot

Table: Layer 0 Overview

To summarize, Layer 0 forms the foundation for the development of full-scale blockchain ecosystems—either by providing the physical infrastructure that enables their existence or by creating the tools that ensure interoperability and scalable growth across one or multiple interconnected networks.

Layer 1 – Base Blockchain Network

Layer 1 is a full-fledged platform that forms the foundation for building projects, DeFi applications, and higher layers of blockchain infrastructure. Projects at this level have their own independent blockchain network, a native cryptocurrency, and unique consensus and security mechanisms. They are responsible for processing transactions, executing smart contracts, creating tokens, and enabling applications that support the functionality of the entire ecosystem.

Layer 1 networks are considered fundamental because they serve as the base for all subsequent layers and application-level services. They are responsible for the core properties of blockchain—security, decentralization, and network reliability. At the same time, it is important

to distinguish between the base infrastructure and the applications built on top of it. For example, Uniswap operates within the Ethereum ecosystem but it belongs to a higher layer as a DeFi application rather than the base network itself.

The limitations of the base layer are best explained by the concept of the **blockchain trilemma**. It states that a network cannot simultaneously achieve maximum decentralization, high security, and scalability. As a result, most Layer 1 solutions prioritize security and decentralization, while scalability is often addressed at Layer 2.

FUNCTIONS	ADVANTAGES	LIMITATIONS	EXAMPLES
Foundation for building Layer 2 and Layer 3 solutions			
Transaction validation and block recording	Security	Scalability limitations	Bitcoin
Block production (mining or staking)	Decentralization	High transaction fees	Ethereum
Execution of smart contracts	Transparency	Blockchain trilemma	Solana

Table: Layer 1 Overview

In essence, Layer 1 can be compared to the operating system of a blockchain ecosystem. It ensures the core functionality of the network, guarantees security and decentralization, and serves as the platform for scaling and further development across higher layers. This is the level that provides the foundation for building complex crypto projects, DeFi applications, and other services within the ecosystem. It also defines the consensus mechanism and transaction validation rules that determine how the network operates and maintains trust among participants. As a result, the performance, scalability, and limitations of Layer 1 directly influence the efficiency and user experience of all applications built on top of it.

Layer 2—Scaling Solutions

Layer 2 can be thought of as the "second floor of our digital building." It consists of auxiliary projects and network technologies that operate on top of Layer 1 blockchains. Their primary goal is to offload the base network and make transactions faster and more cost-efficient—without compromising the security and decentralization provided by Layer 1.

The core principle behind Layer 2 is moving computation off the main blockchain. Most transactions are processed outside the Layer 1 network, within a specialized Layer 2 environment. After processing, only a compressed and verified result is submitted back to Layer 1, rather than every individual transaction. This approach significantly reduces the load on the base blockchain and increases overall network throughput.

FUNCTIONS	ADVANTAGES	LIMITATIONS	EXAMPLES
Processing large volumes of transactions off the main blockchain (Layer 1)	Faster transactions	Transaction confirmation delays	*Lightning Network*
Reduction of load on the main network (Layer 1)	Lower fees	Integration complexity (programming languages)	*Optimism*
Lower transaction fees (gas fees)	Scalability improvement	Potential exploits during early development stages	*zkSync*
Fundation for scalability and Layer 1 offloading			

Table: Layer 2 Overview

For users, this translates into faster transaction confirmations, lower fees, and a smoother experience when interacting with decentralized applications. For the broader ecosystem, Layer 2 is a critical scaling component that alleviates pressure on the base layer.

As a result, blockchain networks become faster, more affordable, and capable of handling a much higher volume of transactions—laying the foundation for mass adoption and a growing user base.

Layer 3 – Decentralized Applications

Layer 3 is built on top of Layer 2 solutions and represents the part of the blockchain ecosystem that users interact with directly. This is where decentralized applications (dApps), services, and user-facing interfaces come to life—crypto wallets, DeFi platforms, NFT marketplaces, gaming applications, and other consumer-oriented solutions.

The main purpose of Layer 3 is to make complex blockchain infrastructure simple, intuitive, and accessible. Users can send funds, swap tokens, or interact with services without needing to understand how consensus mechanisms work, where data is stored, or how blocks are produced. All technical processes are hidden "under the hood," while interaction happens through familiar UI elements such as buttons, menus, and straightforward user flows.

Layer 3 is also responsible for user experience. It directly influences application responsiveness, interface usability, wallet security, and the overall perception of blockchain technology. If Layer 2 solves the scalability problem, Layer 3 addresses the challenge of mass adoption. In addition, Layer 3 plays a key role in cross-chain interaction. Through specialized protocols, applications can operate across multiple blockchain networks, exchange data, and execute transactions between different ecosystems. For users, this means being able to interact with multiple networks through a single interface without noticing their technical differences.

It also enables composability between applications, allowing different services to integrate seamlessly and build on each other's functionality. Developers can create interconnected ecosystems where data and assets flow freely across platforms, increasing overall utility. This layer further supports personalization, enabling applications to adapt to user behavior and preferences in real time. Ultimately, Layer 3 is what transforms blockchain technology from a complex infrastructure into a practical and user-friendly digital experience.

Below is a summary table outlining the key functions, advantages, challenges, and real-world examples of Layer 3.

FUNCTIONS	ADVANTAGES	LIMITATIONS	EXAMPLES
Creation of decentralized applications (dApps)	Innovation	High usability (UX) requirements	
Development of financial products (DeFi, RWA)	Simplified dApp development	Integration with many networks	Uniswap
Marketplaces for buying, selling, and exchanging assets	Accessibility	Scalability challenges due to network load	LayerZero
Wallets and digital asset management	Interoperability	Application security and exploit risks	OpenSea
User interfaces for blockchain interaction	Easy integration	Dependence on Layer 1 and Layer 2 stability for reliable performance	
Built on top of Layer 2			

Table: Layer 3 Overview

In conclusion, Layer 3 is the level where blockchain technology becomes understandable and practical for everyday users. It is where decentralized solutions begin to feel and function like familiar digital services but with additional benefits such as transparency, security, and the absence of centralized control. This layer bridges the gap between complex blockchain infrastructure and real-world usability.

It provides interfaces and user experiences that significantly lower the entry barrier and allow interaction with blockchain systems without deep technical knowledge. As a result, Layer 3 becomes a key driver of mass adoption of decentralized technologies, turning blockchain from a niche innovation into a widely usable digital infrastructure.

Layer 4 – Application Services

This layer is best understood in a broader context of user interfaces and analytical tools that make blockchain activity visible and easy to interpret. These solutions transform complex underlying network processes into visual metrics, charts, and dashboards that can be analyzed without deep technical expertise.

Thanks to these tools, users can track transactions, analyze network activity, monitor capital flows, study participant behavior, and evaluate the overall health of an ecosystem. This creates a complete picture of how a blockchain actually operates and enables more informed decision-making based on real data rather than assumptions or information noise.

FUNCTIONS	ADVANTAGES	LIMITATIONS	EXAMPLES
Providing simplified access to blockchain	Accessibility	Centralization	Etherscan
Interaction with crypto assets	Ease of use	Vulnerability	Arkham
Blockchain data analysis	Data visualization	Dependence on third parties (API access)	Coinglass

Table: Layer 4 Overview

Layer 4 focuses on application services and analytics platforms that provide convenient, structured access to blockchain networks and crypto assets. At this level, users perceive blockchain not as a technical protocol but as a set of practical tools for market analysis, risk assessment, and financial decision-making.

For beginners, this is especially important, as Layer 4 allows interaction with the ecosystem without requiring an understanding of protocol architecture, node operation, or consensus mechanisms.

In a broader sense, Layer 4 acts as a bridge between technology and users. It supports mass adoption of blockchain solutions by integrating them into everyday financial, investment, and analytical workflows. The

rapid growth of decentralized services and the increasing demand for transparent data have driven the recognition of this layer as a distinct concept.

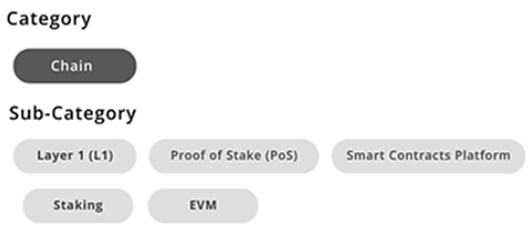
From a technical standpoint, however, Layer 4 remains a sublayer of Layer 3, extending and refining its functionality. Its core role is to make blockchain accessible to a wide audience—including users without any technical background. Thanks to this layer, digital assets and blockchain technology move from a specialized field into a practical everyday tool for millions of people.

Part II: Ecosystem Components

We've already explored the multi-layered architecture of the blockchain ecosystem and reviewed examples of projects operating at each level—from foundational networks like Bitcoin and Ethereum to application-layer solutions and interfaces at Layer 3 and Layer 4.

The next step is to understand how crypto projects are classified and what role each of them plays within this architecture. In this part of the chapter, we will focus on the main categories of crypto projects and analyze them in relation to their respective layers within the blockchain stack. This approach helps not only to identify the technological foundation of a project but also to clearly understand the specific function it performs within the ecosystem.

At the same time, we will touch on broader sectors such as DeFi, DAO, DEX, RWA, and others that contribute to the multi-dimensional and comprehensive nature of the modern blockchain environment.



Source: Project representation| **CRYPTORANK**

When a user first encounters platforms like Cryptorank or similar analytics tools, they are often faced with an overwhelming amount of data and a wide variety of categories. To be honest, even experienced researchers can find it challenging to quickly navigate and locate relevant information about a specific project. This is where a foundational understanding of blockchain layers becomes essential—it simplifies navigation across this complex landscape of services.

Moving forward, we will systematically rely on this framework—Layer 0, 1, 2, 3, and 4. On top of this structure, depending on a project's focus and specialization, we will determine its primary category.

The **main category** reflects the core role of a project within the digital asset ecosystem—the specific need it fulfills.

These categories include but are not limited to:

- **Currency**
- **Chain**
- **Stablecoin**
- **Infrastructure**
- **Services**
- **DeFi**
- **GameFi**
- **DePIN**
- **NFT**
- **RWA**
- **Social**
- **Others**

In addition, there are subcategories that describe the technological implementation or specialization of a project. These depend on the tools and approaches used in development, such as EVM, ZK, Node, Smart Contract, and similar frameworks.

Subcategories provide a deeper understanding of a project's technical specifics and its competitive advantages within its primary category.

Category: Chain

The Chain category is one of the most fundamental in the blockchain ecosystem, as it encompasses the core technologies on which the entire digital asset infrastructure is built. Projects in this category create the conditions for launching new blockchain networks, ensure their scalability, and establish the foundation for developing full-fledged ecosystems. This includes the entire technology stack—from network infrastructure to base protocols and scaling solutions.

Within the chain category, several key subcategories can be identified, each corresponding to different layers of blockchain architecture.

Layer 0. This subcategory includes projects that provide core network infrastructure and enable interaction between different blockchains. It is responsible for cross-chain communication, interoperability, and ecosystem synchronization. Layer 0 creates the conditions for separate networks to function as part of a unified environment.

Examples: Polkadot, Cosmos and Avalanche.

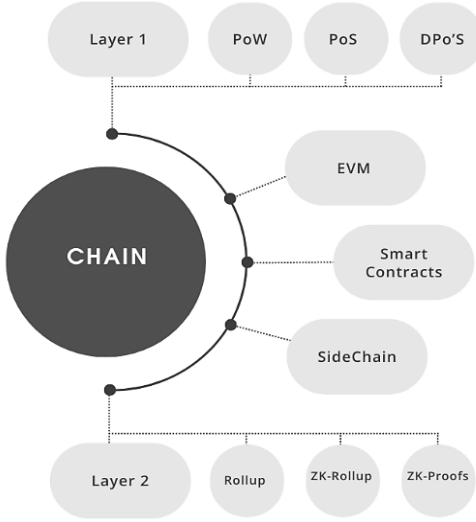


Diagram: Hierarchy and Subcategories within the Chain Category

Layer 1. This subcategory includes projects with their own independent blockchain. These networks form the base layer of the ecosystem, ensuring security, decentralization, and transaction processing. Depending on the consensus mechanism, they are classified as Proof of Work (PoW), Proof of Stake (PoS), or Delegated Proof of Stake (DPoS).
Examples: Bitcoin, Ethereum and TRON.

Layer 2. This subcategory focuses on projects designed to improve the scalability and performance of Layer 1 networks. They process transactions off-chain, reducing network congestion and transaction fees. Depending on the scaling technology used, these solutions include Rollups, ZK-Rollups, ZK-Proofs, and other approaches.
Examples: Optimism, Arbitrum, Polygon, zkSync and Stacks.

EVM (Ethereum Virtual Machine). This subcategory includes projects that provide compatibility with the Ethereum Virtual Machine. This allows developers to deploy smart contracts and decentralized applications originally built for Ethereum with little or no modification, simplifying migration and expanding the Ethereum ecosystem across multiple networks.
Examples: BNB Chain, Avalanche C-Chain, Polygon and Fantom.

Smart Contract Platform. This subcategory focuses on platforms designed for creating and executing smart contracts—self-executing code that enforces agreements without intermediaries. These platforms serve as the foundation for DeFi, NFTs, DAOs, and other decentralized services, offering different approaches to security, speed, and scalability.
Examples: Ethereum, Solana, Cardano and Near.

Sidechain. This subcategory includes independent blockchains that operate alongside a main network and have their own consensus mechanisms. Sidechains enable the transfer of assets between networks, reduce the load on the main blockchain, and allow experimentation with new features without risking the stability of the primary network.
Examples: Polygon PoS, Gnosis Chain and Ronin.
Together, these subcategories form the technological backbone of the blockchain ecosystem, enabling the creation, scaling, and interoperability of modern digital asset networks.

Category: Decentralized Finance (DeFi)

Decentralized Finance, or **DeFi**, is one of the most dynamic and foundational sectors in the crypto ecosystem. It represents a fundamental redesign of financial infrastructure—where traditional services are rebuilt as open, programmable, and permissionless systems.

Powered by blockchain technology, smart contracts, oracles, and decentralized governance, DeFi enables users to trade assets, earn yield, access liquidity, hedge risks, and transfer value globally—without relying on banks or centralized intermediaries.

At its core, DeFi replaces institutional trust with mathematical certainty and transparent code. Every transaction, rule, and financial mechanism is verifiable on-chain, creating a system that is not only open but also inherently auditable.

A defining feature of DeFi is the absence of mandatory identity verification. In traditional finance, most operations require KYC (Know Your Customer), which introduces friction and exclusion. While necessary for compliance, it limits access for millions.

In DeFi, these barriers disappear. A wallet and an internet connection are enough to access global financial services. This has profound implications: according to the World Bank, nearly two billion adults remain unbanked. DeFi offers them a parallel financial system—one that is borderless, neutral, and inclusive.

Another cornerstone of DeFi is DAO (Decentralized Autonomous Organizations). Governance is no longer centralized—users collectively vote on protocol changes, treasury allocation, and long-term strategy. This transforms users into active participants and stakeholders, rather than passive consumers.

DeFi is not just replicating traditional finance—it is redefining it. It introduces:

- programmable money
- composable financial products
- and continuous innovation without permission

DeFi is gradually forming a new financial reality where transparency and accessibility are core principles. Within this ecosystem, multiple subcategories have emerged, replicating traditional financial instruments in a decentralized environment.

Diagram: Hierarchy and Subcategories within the DeFi

Lending and Borrowing. This sector recreates credit markets in a decentralized environment, allowing users to lend assets or borrow against collateral without intermediaries or credit checks. Loans are typically overcollateralized and executed automatically via smart contracts.

For example, an ETH holder can use it as collateral to borrow stablecoins without selling their position, preserving exposure while unlocking liquidity. This mechanism allows capital to remain productive instead of idle, fundamentally changing how assets are utilized.

Examples: Aave, Compound.

Insurance. DeFi insurance enables users to protect assets against smart contract failures, hacks, and other risks inherent to decentralized systems. Insurance pools are funded by participants, while claims are processed through transparent mechanisms governed by smart contracts and community voting.

This model replaces opaque insurance structures with open and verifiable systems, creating a native risk-management layer where users collectively share and mitigate risks.

Examples: Nexus Mutual, InsurAce and Sherlock.

Decentralized Exchanges (DEX). DEXs allow users to trade assets directly from their wallets without relying on centralized platforms. Smart contracts automate transactions, while liquidity pools replace traditional order books.

Liquidity providers earn fees, and traders gain uninterrupted access to global markets without restrictions. This model ensures that users maintain full custody of their assets, eliminating counterparty risk associated with centralized exchanges.

Examples: Uniswap, Curve, Jupiter and Aerodrome.

Yield Instruments. These tools allow users to generate passive income from crypto assets by deploying capital into yield-generating protocols.

Key strategies include:

- **Staking:** Locking tokens to secure the network and earn rewards.
- **Liquid Staking:** Receiving derivative tokens (e.g., stETH) while maintaining liquidity.
- **Yield Farming:** Providing liquidity to earn rewards and incentives.

Examples: Yearn Finance, Convex, Lido, Rocket Pool and Stader.

Restaking. Restaking introduces an advanced layer of capital utilization by allowing users to reuse already staked assets to secure additional protocols. This extends the role of capital beyond a single network.

By enabling the same assets to contribute to multiple systems, restaking improves overall ecosystem security while simultaneously increasing user rewards. It represents a shift toward shared security models and more efficient allocation of resources.

Examples: EigenLayer.

Derivatives. DeFi derivatives bring complex financial instruments on-chain, allowing users to hedge risk, speculate on price movements, and use leverage.

Perpetual contracts, for example, enable traders to maintain leveraged positions without expiration, making them highly flexible tools for active market participants. This expands DeFi beyond simple transactions into a more sophisticated financial environment capable of supporting advanced strategies.

Examples: Hyperliquid, Synthetix, dYdX and GMX.

Governance Tokens. Governance tokens give users the ability to participate in protocol decision-making. Token holders can vote on upgrades, adjust parameters, and influence how funds are allocated.

This shifts control from centralized entities to distributed communities, aligning incentives between users and developers while fostering long-term sustainability of protocols.

Examples: Uniswap, Aave, MakerDAO (Sky) and Compound.

Stable Protocols (Stablecoins). Stablecoins provide price stability in an otherwise volatile crypto market. They are typically pegged to fiat currencies and serve as a reliable medium for transactions, lending, and liquidity provision.

By reducing exposure to price fluctuations, stablecoins make DeFi usable for everyday financial operations and form the foundation for most on-chain economic activity.

Types include:

- Fiat-backed (custodial)
- Crypto-backed (decentralized)
- Algorithmic

Examples: MakerDAO (DAI), Frax, Curve DAO and Liquity (LUSD).

Crypto-Basked Tokens. These tokens are created by locking crypto assets in smart contracts and issuing a new token that represents the underlying value. This allows users to retain exposure to an asset while using its tokenized version across DeFi protocols.

Such tokens enable greater interoperability and composability, allowing assets to move seamlessly between platforms and participate in multiple strategies simultaneously.

Examples include:

- **wBTC (Wrapped Bitcoin):** BTC usable in Ethereum DeFi
- **sETH (Synthetic ETH):** Tracks ETH price without ownership
- **crvUSD:** Stablecoin optimized for DeFi usage

DeFi forms a fully interconnected financial system where each component reinforces the others. Lending supports liquidity, stablecoins enable transactions, DEXs power markets, and yield strategies optimize capital.

Together, these elements create a system that is not only decentralized but also programmable, transparent, and globally accessible—reshaping how financial services are built, accessed, and experienced**.**

The Next Evolution: DeFi 2.0

DeFi 2.0 represents the next generation of decentralized finance protocols, designed to address the structural limitations of early DeFi and build a more scalable, sustainable, and resilient financial ecosystem.

This is not just a technological upgrade—it is a shift in paradigm. While DeFi 1.0 focused on open access, DeFi 2.0 emphasizes efficiency, sustainability, and long-term value creation.

The new wave of protocols prioritizes:

- more effective liquidity management
- reduced reliance on speculative capital
- and the creation of robust economic models that can sustain long-term growth

The Core Focus Areas of DeFi 2.0

1. **Sustainable Liquidity**.

Early DeFi relied heavily on liquidity mining, where users quickly moved capital between protocols in search of short-term rewards.

DeFi 2.0 introduces models where protocols own or control their liquidity, reducing dependence on external providers and creating long-term stability.

2. **Decentralization**.

New protocols aim to reduce reliance on centralized components such as:

- single-source oracles
- fiat-backed stablecoins

Instead, they adopt more decentralized and resilient data and collateral systems.

3. **DAO-Driven Governance**.

Governance becomes more deeply embedded into protocol design. DAOs evolve from simple voting mechanisms into core operational structures, managing:

- treasury funds
- incentive

- and long-term strategy

4. **Institutional Scalability**.

DeFi 2.0 moves toward predictable, structured systems that can support institutional participation and B2B use cases, making the ecosystem more attractive for large-scale capital.

The Core Focus Areas of DeFi 2.0:

1. **Liquidity Mining Instability**.

In DeFi 1.0, users often sold reward tokens immediately, creating downward pressure and weakening protocols.

DeFi 2.0 introduces:

- bonding mechanisms
- locked staking models

which encourage long-term participation and align incentives between users and protocols.

2. **Inefficient Liquidity**.

Liquidity was fragmented across platforms, reducing capital efficiency.

In DeFi 2.0:

- LP tokens can be reused as collateral
- liquidity is actively managed
- capital becomes multi-functional

This significantly improves overall efficiency within the ecosystem.

3. **Security Risks**.

Early protocols were frequently exploited due to immature smart contract design.

DeFi 2.0 incorporates:

- smart contract audits
- insurance mechanisms
- compensation systems for losses

This creates a more secure environment and increases user confidence.

4. **Scalability and High Fees**.

DeFi 1.0 was heavily dependent on Ethereum, leading to congestion and high transaction costs.

DeFi 2.0 adopts:

- Layer 2 solutions
- multi-chain architectures
- making transactions faster and more affordable

5. **Oracle Centralization**.

Dependence on single oracle providers created systemic risks.

Modern protocols use:

- multiple oracle sources
- data verification layers

to ensure reliability and reduce manipulation risks.

Below are the key stages of the evolution of decentralized finance, illustrating shifts in approaches, protocol architecture, and economic models from DeFi 1.0 to DeFi 2.0.

PARAMETER	DEFI 1.0	DEFI 2.0
Liquidity	Short-term	Sustainable, protocol-owned liquidity
Incentives	LP token rewards	Bonds, DAO structures, and investment models
Governance	Hybrid decentralized-centralized	Fully decentralized
Security	Limited testing	Insurance, audits
Scalability	Ethereum-centric	Multi-chain, Layer 2 (L2), and optimization

Table: DeFi 1.0 vs. 2.0

DeFi 2.0 unlocks new possibilities for efficient asset management. LP tokens can now be used as collateral for loans or integrated into other protocols,

significantly increasing capital efficiency. Special attention is given to mitigating impermanent Loss.

Hedging mechanisms—including insurance funds and specialized internal tokens—help reduce risks for liquidity providers. Smart contract insurance adds another layer of protection, safeguarding funds against potential code vulnerabilities in a way that resembles traditional bank deposit insurance.

Pioneers of DeFi 2.0 introduced fundamentally new approaches to liquidity and capital efficiency. One of the earliest examples is OlympusDAO, which pioneered an alternative to the classic liquidity model through a bond mechanism: investors sell assets to the protocol's treasury in exchange for discounted tokens. This creates long-term incentives and reduces dependence on short-term rewards.

Alchemix further evolved capital efficiency by enabling users to take loans backed by their future yield. If an asset generates income—for example, through staking—a portion of that yield can be accessed upfront in the form of a loan.

The Abracadabra protocol (Spell Token) pushed this concept even further by combining key DeFi 2.0 principles into a unified ecosystem. Users can borrow against yield-bearing collateral—such as LP tokens or staked assets from other protocols like Yearn or Convex.

Category: Blockchain Infrastructure

This direction covers the full stack of technologies, protocols, and networks that ensure the stable operation, scalability, and interoperability of blockchain ecosystems. Projects in this category are rarely in the spotlight for end users, yet they form the technical backbone of the entire crypto industry.

Unlike application-layer services, infrastructure solutions do not always issue their own tokens or decentralized applications. Their primary mission is to provide other blockchains with a reliable, secure, and efficient foundation for growth.

They simplify interoperability between different networks, ensure data availability and integrity, and create seamless conditions for both developers and end users. Thanks to this infrastructure layer, blockchain is no longer an isolated technology—it evolves into an interconnected, unified ecosystem.

This category includes several core infrastructure domains that perform mission-critical functions: data transmission and storage, cross-chain communication, secure user connectivity, identity systems, and even physical-world infrastructure.

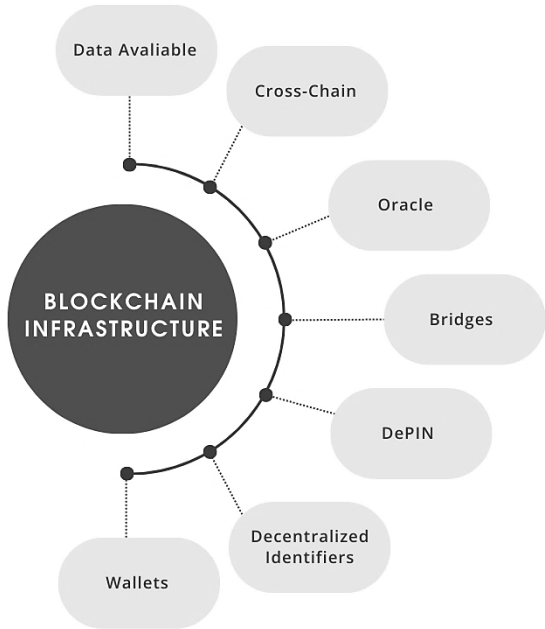


Diagram: Hierarchy and Subcategories within the Blockchain Infrastructure

Collectively, these components ensure the integrity, scalability, and decentralization of the entire system. Each domain plays its own role in supporting and advancing the digital infrastructure that makes everyday blockchain usage possible. Below, we briefly explore each of them to understand how the foundation of the modern crypto ecosystem is built.

Data Availability. Data availability ensures that all data required to verify transactions is accessible to every node in the network. This is especially critical for Layer 2 solutions—particularly rollups—where the correctness of computations cannot be verified without full and open access to underlying data.

In this sense, data availability guarantees transparency, security, and trust in scalable blockchain systems.

Examples: Celestia, EigenLayer and NEAR Protocol.

Cross-Chain Solutions. Cross-chain technologies enable interoperability between different blockchain networks. They allow assets and data to move across ecosystems, transforming blockchain from a fragmented environment into a connected one.

With cross-chain solutions, users can interact with the same asset across multiple networks without dealing with the technical limitations of each individual blockchain. These approaches are essential for the growth of DeFi, multi-chain wallets, and interchain protocols.

Examples: Cosmos IBC, Polkadot, LayerZero and Axelar.

Oracles. Oracles act as a bridge between blockchains and the real world. Since blockchain networks are closed systems with no native access to external data, oracles supply smart contracts with information such as prices, events, exchange rates, and API-based metrics.

Without oracles, most DeFi protocols, derivatives platforms, and insurance applications simply would not function. They ensure accurate smart contract execution and extend blockchain capabilities far beyond internal network logic.

Examples: Chainlink, Band Protocol and Pyth.

Bridges. Bridges are a core infrastructure element in multi-chain environments. They enable the transfer of assets and data between different blockchain networks, allowing ecosystems to interact without losing liquidity.

This is often achieved through wrapped asset mechanisms, where a token from one blockchain is represented by an equivalent asset on another

network. Bridges make capital flow freely across ecosystems and reduce market fragmentation.

Examples: Wormhole, Multichain and Stargate.

Decentralized Physical Infrastructure (DePIN). DePIN represents a new stage in blockchain adoption by connecting digital systems with the physical world. This sector uses blockchain and token-based incentives to build and manage real-world infrastructure.

It includes wireless networks, computing power, data storage, sensor systems, and energy solutions. The core idea is to incentivize users to deploy and maintain infrastructure through economic rewards.

Over time, control and ownership shift from centralized corporations to decentralized communities. Leading DePIN projects include Helium, Filecoin, and Render Network.

Decentralized Identifiers (DID). Decentralized identifiers introduce a new paradigm for digital identity in Web3. Unlike traditional systems where accounts are controlled by platforms, DID allows users to fully own and manage their identity.

A DID is tied to the individual—not to a service—and can store verifiable data that only the owner controls. This significantly improves privacy, security, and autonomy in digital environments.

Examples: World Network, Sign and Artificial Superintelligence Alliance.

Wallets. Wallets are the primary entry point into the blockchain ecosystem. A wallet stores cryptographic keys that provide access to on-chain assets, enables transaction signing, and allows interaction with decentralized applications.

Different wallet types offer different trade-offs between convenience and security, making wallet selection a key part of any personal digital asset strategy.

Examples: MetaMask, Ledger, Trezor, and Trust Wallet.

Privacy. Privacy remains a critical area of blockchain infrastructure, even despite the transparent nature of most networks. Many use cases require limiting exposure of sensitive data and transaction details.

To address this, specialized cryptographic methods are used—most notably zero-knowledge proofs—which allow validation of information without revealing the underlying data.

These technologies expand blockchain applications in finance, identity systems, and enterprise environments.

Examples: Monero, Zcash, and Aztec Network.

Category: Blockchain Services

This segment brings together tools and services that operate on top of the core blockchain infrastructure, making it usable in everyday life. If infrastructure layers are responsible for network reliability and scalability, then services take on a different role—they simplify interaction with blockchain systems and lower the entry barrier for both individuals and businesses.

These solutions help developers build decentralized applications faster, without needing to dive deep into the underlying technical complexity of the network.

For end users, they make Web3 more understandable, intuitive, and accessible—transforming a complex technology stack into something that can be used naturally. This category includes services for blockchain data

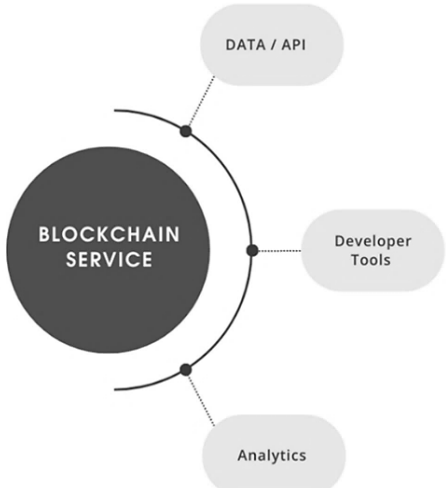


Diagram: Hierarchy and Subcategories within the Blockchain Services

access, developer tooling, and analytics platforms. Together, they form the application layer of the ecosystem, without which blockchain would remain a niche technology reserved for specialists.

In the long run, this segment will largely determine the speed of blockchain integration into the real economy and everyday digital services. It acts as a bridge between complex technological foundations and end users, enabling mass adoption of Web3 solutions.

Below, we explore the key subcategories of blockchain services and the role each of them plays in the evolution of Web3.

Data (Data API). Data services act as translators between blockchain systems and humans. They provide structured, readable access to on-chain data, freeing developers and analysts from working with raw blockchain information. Thanks to these solutions, building blockchain-based products becomes faster and significantly less technically complex. You get the right data at the right time—without needing to understand the internal mechanics of the network.

Examples: The Graph, Alchemy and Dune.

An API (Application Programming Interface) allows different software systems to communicate with each other. In the blockchain context, APIs enable applications to retrieve data and interact with network functions without directly engaging with the underlying infrastructure. This is one of the key mechanisms that makes blockchain accessible for mainstream adoption

Developer Tools. Developer tools provide the working environment for building Web3 applications. They include frameworks and platforms that help developers write, test, and deploy smart contracts, connect to blockchain networks, and scale applications without unnecessary technical friction.

These tools significantly shorten the path from idea to production-ready product, allowing developers to focus on logic and user experience rather than infrastructure complexity.

Popular solutions in this category include Hardhat, Foundry, Remix IDE, Infura, Thirdweb and Alchemy SDK.

Analytics. Analytics services transform blockchain into a powerful source of market intelligence. They enable real-time tracking of capital flows, wallet behavior, user activity, and project-level financial metrics.

For investors, traders, and researchers, these tools are essential for understanding risk, market cycles, and the true underlying economy of blockchain ecosystems. Through analytics, blockchain transparency becomes a practical advantage rather than just a technical feature.

Leading platforms in this segment include Arkham, Nansen, Token Terminal, and Messari.

Category: Currency

This segment includes cryptocurrencies designed primarily as a medium of exchange and a store of value within blockchain ecosystems. These are digital equivalents of money that operate without the involvement of banks or government institutions, enabling direct peer-to-peer transactions on a global scale.

The core value of these assets lies in their simplicity and reliability. Rather than focusing on complex functionality or expansive application ecosystems, they are built to fulfill the fundamental role of money in a digital environment.

Thanks to decentralization and limited supply, many of these assets are widely perceived as a hedge against inflation and a tool for long-term value preservation. The most prominent example in this category is Bitcoin, which has become the benchmark for digital money and the foundation of the entire crypto market.

Alongside it, projects like Litecoin and Dash continue to develop the concept of fast, accessible, and independent payment systems.

At the same time, the effectiveness of these assets largely depends on liquidity levels and the degree of trust from users and the broader market.

Category: Centralized Finance (CeFi)

Centralized Finance (CeFi) represents the centralized segment of the crypto industry, combining digital assets with a traditional financial

management model. In CeFi, financial services are delivered through centralized platforms that act as intermediaries between users and the market—handling asset custody, transaction processing, and risk management.

These platforms typically offer intuitive interfaces, fast execution, and customer support, making CeFi especially appealing to newcomers. Core services include centralized exchanges, custodial wallets, lending, staking, derivatives, and fiat on- and off-ramps that enable seamless entry into and exit from the crypto market.

At the same time, CeFi requires trust in a third party. Users do not control their private keys and rely on the platform's security, operational integrity, and regulatory environment. For this reason, CeFi is often viewed as a transitional model between traditional finance and DeFi—blending the convenience of conventional financial services with access to digital assets.

Category: NFT

This sector brings together digital assets that are unique and non-fungible. In simple terms, an NFT can be thought of as a digital certificate that verifies ownership of a one-of-a-kind item on the internet. Just as an original painting or a collectible card derives its value from its uniqueness, NFTs serve the same purpose in the digital world.

These tokens confirm authenticity and ownership of digital art, collectibles, in-game assets, music, virtual real estate, and other unique files. For owners, NFTs unlock a wide range of opportunities—from collecting and trading to content monetization and participation in gaming ecosystems and metaverses.

At the same time, it's important to understand the key distinction between NFTs and traditional cryptocurrencies. Unlike fungible tokens, each NFT is unique and cannot be exchanged on a one-to-one basis. While Bitcoin or Ethereum are fungible—each unit holding the same value—every NFT is distinct and has no exact equivalent. This property forms the foundation of a new model of digital ownership.

That said, the real value of NFTs is largely driven by demand, cultural relevance, and their utility within specific ecosystems.

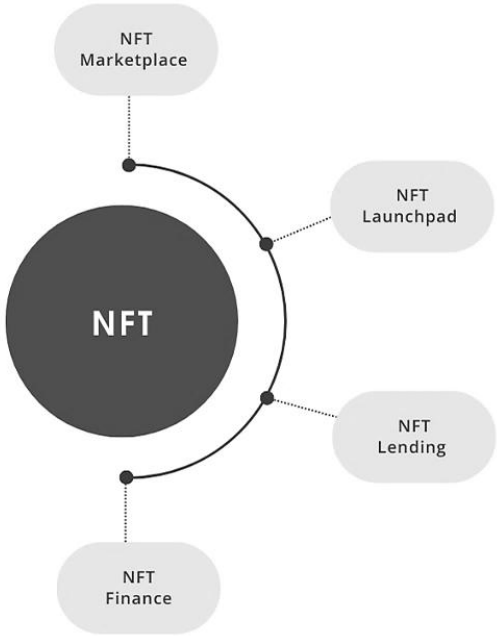


Diagram: Hierarchy and Subcategories within the NFT

Within the NFT ecosystem, several distinct subcategories have emerged, each unlocking different aspects of non-fungible tokens and addressing the needs of creators, investors, and users. This flexibility allows NFTs to adapt to a wide range of use cases—from digital art to integration into financial and gaming products.

NFT Marketplaces. NFT marketplaces are digital platforms where non-fungible tokens are bought, sold, and traded. This is where market liquidity is formed and where the value of digital assets is discovered.

The most widely known platform is OpenSea, which supports multiple blockchains and caters to a broad user base. Blur focuses on professional traders and high-frequency trading, while Magic Eden has become a key hub within the Solana ecosystem.

Other platforms, such as LooksRare and X2Y2, emphasize decentralization and lower fees, redistributing value back to the community.

NFT Finance. NFT Finance bridges NFTs with decentralized finance (DeFi) mechanisms. In this segment, NFTs evolve from collectible items into financial instruments.

Platforms like NFTfi and BendDAO allow users to take out loans using NFTs as collateral without selling them. JPEG'd expands this model by enabling the issuance of stablecoins backed by NFTs, while Drops DAO focuses on multi-chain liquidity.

Together, these innovations form a new financial layer where digital uniqueness gains tangible economic value.

NFT Launchpads. NFT launchpads are platforms designed to help creators launch new NFT collections and support them at early stages. They assist with minting audience building and provide both technical and marketing infrastructure.

Notable solutions include Zora, Manifold, and LaunchMyNFT. Meanwhile, Magic Eden Launchpad has become a major hub for launching collections on Solana and Ethereum, combining ease of use with access to a large community.

NFT Lending. Lending platforms focus on lending and renting NFTs as fully fledged financial assets. These services allow owners to unlock liquidity without relinquishing ownership, while lenders earn yield through interest.

Platforms such as Arcade.xyz, NFTfi, and Astaria are building bridges between the NFT market and DeFi lending—gradually transforming NFTs into instruments for long-term financial utility.

Category: Metaverse

Imagine a world where the boundaries between physical and digital reality gradually disappear. It's a space where you can own virtual land, build digital businesses, attend concerts, connect with people from around the globe, compete in events—and even earn income without leaving your home.

If you're familiar with the film Ready Player One, you already have an intuitive sense of a global virtual universe where people live parallel digital lives.

However, the Web3 metaverse is not just science fiction—it's an emerging technological frontier already taking shape through blockchain, NFTs, and community-driven platforms. Its defining feature is true ownership. Users don't just interact with digital objects—they actually own them, from virtual land and avatars to in-game items and unique identities. This ownership is secured through NFTs, which serve as verifiable proof of digital asset ownership.

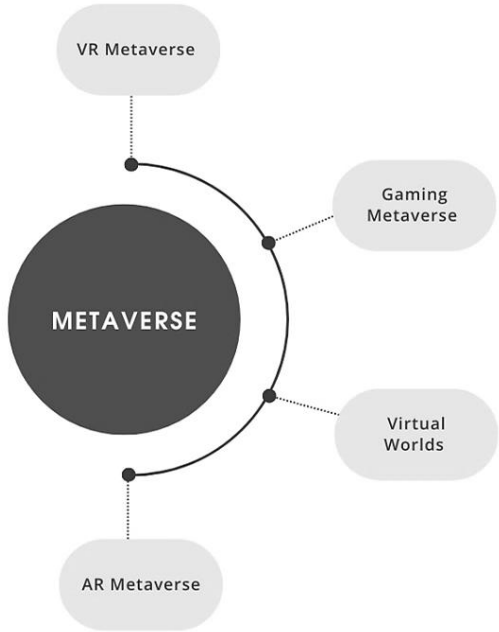


Diagram: Hierarchy and Subcategories within the Metaverse

The metaverse naturally extends the philosophy of Web3, where control and value shift from centralized platforms to users. That's why this category isn't a single product or technology—it's an ecosystem composed of several interconnected subcategories. Each plays a distinct role in building a cohesive digital universe.

Gaming Metaverse. The gaming metaverse focuses on gamified experiences where gaming goes far beyond entertainment. Users don't just play-they create content, own in-game assets, and monetize their participation. In this environment, gaming evolves into a full-fledged economic system where time, skill, and engagement carry real-world value.
Examples: Gala Games, Immutable, and Big Time.

Virtual Worlds. Virtual worlds are metaverse platforms with their own digital infrastructure, where users can own land, build environments, host events, and interact with others. These platforms create a new type of social digital space where ownership and creativity merge with communication.
Examples: Decentraland and The Sandbox.

VR/AR Metaverse. The VR/AR Metaverse combines blockchain with virtual reality (VR) and augmented reality (AR) technologies to bring digital experiences closer to physical presence. These projects explore new levels of immersion, where the line between real and virtual becomes increasingly blurred.
Examples: Victoria VR, OVR, Somnium Space Cubes, and Wilder World.

Category: GameFi

GameFi represents a new paradigm in blockchain gaming—one where users don't just play but actually own the outcomes of their activity and earn financial rewards for participation. This is not a passing trend but a fundamental shift in the relationship between players and digital environments.

In traditional games, the economy is fully controlled by the developer: items, characters, and achievements remain locked within a closed system, with no real exit for the player. GameFi changes this model entirely. Here, the economy belongs to the users themselves, who collectively shape and evolve the game world.

Players earn tokens or NFTs based on skill, progress, and achievements. These can include virtual land, characters, weapons, artifacts, or rare items. All of these assets exist as NFTs are stored on-

chain, and carry real market value. They can be freely traded, exchanged, or used across different parts of the ecosystem.

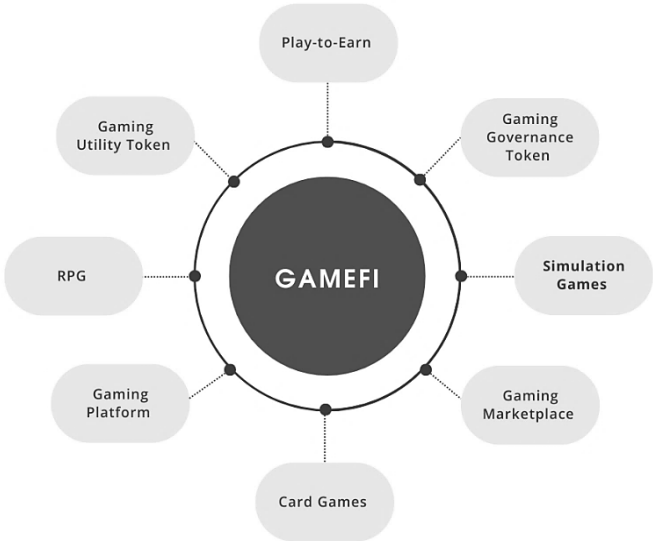


Diagram: Hierarchy and Subcategories within the GameFi

Play-to-earn and play-and-own mechanics allow players not just to spend money but to invest time and effort with the expectation of long-term value. Under the hood, this model is powered by a full stack of technologies: NFTs establish ownership, tokens drive in-game economies, smart contracts automate rules and interactions, and DeFi mechanisms add financial flexibility—from staking to lending and liquidity.

Play-to-Earn (P2E). Play-to-earn is a model where players receive tokens or NFTs simply for participating in gameplay. Character progression, battle victories, quest completion, and tournament participation all become economically valuable activities.

In this model, the player is no longer a passive user—they become an active participant in the game economy. Notable examples include Axie Infinity and Thetan Arena

Gaming Utility Tokens. Gaming utility tokens are in-game tokens that power day-to-day functionality. They are used for purchasing items, upgrades, participating in activities, or building in-game assets.

These tokens are focused on utility rather than governance. Strong examples include ecosystems like The Sandbox and Pixels

Gaming Governance Tokens. Gaming governance tokens give players a voice in the development of the project. Token holders can vote on game updates, rule changes, feature releases, and asset issuance—bringing users closer to co-ownership of the platform.

Well-known examples include AXS within the Axie Infinity ecosystem and GALA in Gala Games.

Role-Playing Games (RPG). Simulation games replicate economic, social, or environmental systems. Players build cities, farms, or entire virtual worlds—owning every element via blockchain.

These are simulations where ownership carries real value and can exist beyond a single game. Leading projects include My Neighbor Alice and Wilder World.

Simulation Games. Simulation games replicate economic, social, or environmental systems. Players build cities, farms, or entire virtual worlds—owning every element via blockchain.

These are simulations where ownership carries real value and can exist beyond a single game. Leading projects include My Neighbor Alice and Wilder World.

Gaming Platforms. Gaming platforms are infrastructure ecosystems that provide tools for developing, launching, and scaling blockchain games. They bring together developers, players, and investors into a unified environment, accelerating the growth of Web3 gaming.

Key platforms include Gala Games, Immutable X, Enjin, and Beam.

Gaming Marketplaces. Gaming marketplaces are platforms for trading in-game assets. Users can buy and sell characters, land, items, or tokens while maintaining full ownership.

Unlike traditional gaming marketplaces, these assets can circulate freely on open markets. Leading platforms include Fractal, TofuNFT, and GameStop NFT Marketplace.

Card Games. Card games are built around collectible cards, where each card exists as an individual NFT. Players build decks, develop strategies, and compete—owning their cards just like physical collectibles.
Popular examples include Gods Unchained and Skyweaver.

Category: SocialFi

A category shaped by next-generation social networks, where human interaction is combined with the economic incentives of Web3. Imagine Facebook or YouTube, where your posts and videos become fully fledged digital assets, your profile doubles as a crypto wallet, and every interaction within the community carries financial value. That's the model SocialFi introduces—a fusion of social platforms and decentralized financial mechanisms.

In this environment, the user is no longer the product of the platform. Instead, they own their content, control their audience, and directly benefit from their activity. Likes, comments, subscriptions, and reputation evolve into components of an economy—not just metrics for advertising algorithms.

SocialFi also addresses one of the biggest issues of traditional social networks: centralized monetization. Where corporations once captured the majority of profits, Web3 social platforms distribute economic value among content creators, active community participants, and even readers. This creates a more equitable model where every contribution matters.

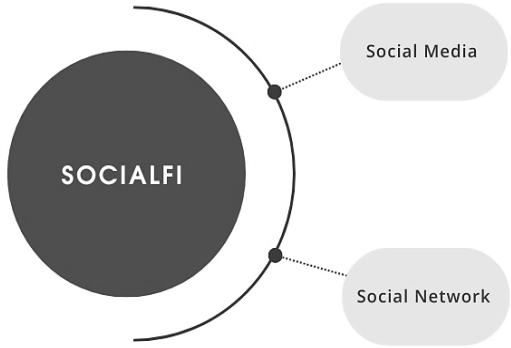


Diagram: Hierarchy and Subcategories within the SocialFi

Depending on whether a platform focuses more on content or on social interaction, SocialFi can be divided into two primary segments:

Social Media. Platforms centered on creating, publishing, and distributing content. Within SocialFi, these services enable creators to directly monetize their posts, videos, or images without relying on advertising intermediaries. Data is typically stored on a blockchain or in decentralized storage solutions like IPFS, and content itself can be tokenized to represent ownership rights. Notable examples include Minds, a decentralized alternative to Facebook that rewards user engagement. DTube, a Web3 version of YouTube with content hosted on IPFS, and Mirror, a platform for tokenized blogging often compared to a Web3-native version of Medium.

Social Networks. Platforms focused less on content and more on building social connections between users. Subscriptions, likes, interactions, and reputation are recorded in smart contracts, while user profiles often exist as NFTs owned by the users themselves. This approach allows the social graph to exist independently of any single application and to be seamlessly ported across platforms. Leading examples in this space include Lens Protocol, where users fully control their profiles and social connections. Farcaster, an open social protocol that enables migration between applications, and CyberConnect, an infrastructure for building decentralized social graphs.

Ultimately, SocialFi transforms social platforms from content consumption tools into fully fledged economic ecosystems where value is created and distributed by the community itself.

Category: Real World Assets (RWA)

The newest category to emerge in the current cycle encompasses assets that exist outside the digital realm but can be integrated into the blockchain ecosystem. This includes both tangible assets—real estate, transportation, precious metals, commodities, and energy resources—as well as intangible assets such as copyrights, patents, licenses, trademarks, and debt instruments.

Through tokenization, these assets gain a “second life” within decentralized financial systems. Tokenization converts a real-world asset into digital units, each representing a fraction of its value.

Imagine real estate divided not among a handful of investors but into hundreds or even thousands of tokens. This dramatically lowers the barrier to entry, opening previously inaccessible markets to a much broader audience. You no longer need full ownership of an asset to participate in its economic value.

Beyond accessibility, tokenized assets unlock a new level of liquidity. Digital tokens can be easily transferred, traded, or used as collateral, while all transactions are recorded on the blockchain—enhancing transparency and reducing the risk of manipulation. Smart contracts automate asset management, streamline execution, and minimize reliance on human intermediaries. Geographic boundaries fade away, making access to assets truly global.

This structure illustrates how RWA integrates traditional asset classes into blockchain-based financial systems—unlocking liquidity, accessibility, and global participation at scale.

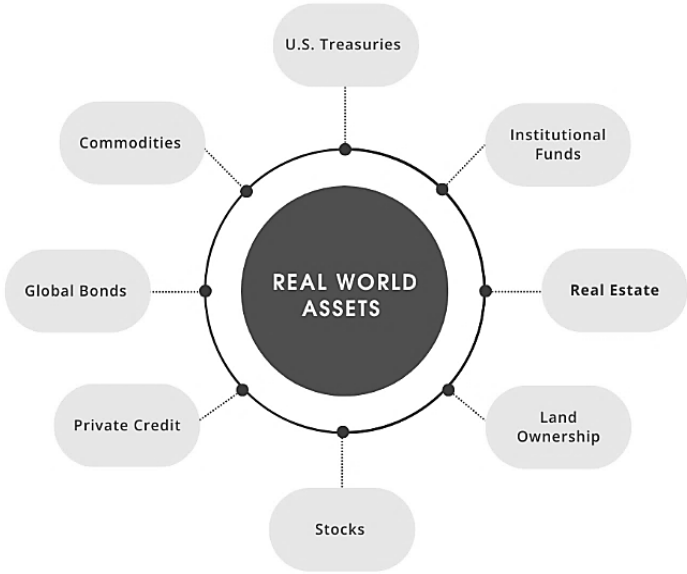


Diagram: Hierarchy and Subcategories within the RWA

In this sense, RWA is not just another asset class within the crypto economy—it is a bridge between traditional finance and decentralized technologies. Through this bridge, capital moves faster, more transparently, and more efficiently, laying the foundation for the next phase of the global digital economy.

At the same time, the development of this sector is closely tied to regulatory frameworks, as integrating real-world assets requires legal clarity and strong property rights protection. Equally important is the quality of asset digitization and the integrity of the underlying data. Successful RWA implementations open the door to new financial instruments that combine the stability of traditional assets with the flexibility of blockchain technology. Ultimately, this segment has the potential to significantly reshape global capital markets.

Within DeFi, several RWA subcategories have already emerged, reflecting different types of tokenized real-world assets integrated into decentralized lending, investment, and liquidity management protocols. This enables traditional assets to serve as the foundation for new financial instruments and strategies. As a result, investment opportunities become accessible to a much wider range of participants—from institutional players to retail investors—marking one of the key transformations of the modern financial system.

Let's explore the primary asset classes you can use to diversify your portfolio.

U.S. Treasuries. Short- and long-term debt instruments issued by the U.S. government are widely considered among the safest investments in the world. For example, Ondo Finance allows users to gain exposure to short-term Treasury bonds through the USDY token, while Securitize provides access to T-bills in a digital asset format for both retail and institutional investors. The key takeaway: stability and reliability can be combined with technology to make investing more accessible.

Global Bonds. Bonds issued by governments or corporations outside the United States, including EU sovereign debt and corporate securities. Backed Finance offers tokens such as bC3M and bHIGH, representing

eurobonds and high-yield corporate bonds. These examples show how global diversification can expand your investment horizon—even with relatively small initial capital.

Private Credit. Loans issued directly by private companies without traditional banking intermediaries. In DeFi, this takes the form of decentralized business lending. Key platforms include MakerDAO, Figure, Maple Finance, Goldfinch, and Centrifuge. These protocols allow investors to fund real-world businesses, tokenize assets, and earn yield without relying on traditional financial institutions.

Commodities. Physical goods such as gold, oil, or agricultural products that can be tokenized and traded on-chain. Paxos offers PAXG, where each token is backed by one physical ounce of gold, while Tether Gold (XAUT) gives holders rights to a corresponding amount of the metal. By investing in tokenized commodities, you can hedge against inflation and market volatility without the burden of physical storage.

Institutional Funds. Financial products are typically managed by large funds or banks. In DeFi, these appear as tokenized funds and derivatives. Ondo Finance and Backed Finance provide exposure to ETFs and publicly traded assets, making institutional-grade strategies accessible to individual investors.

Tokenized Stocks. Shares of publicly traded companies represented in digital form. Backed Finance (xStocks) offers tokenized exposure to major companies such as Apple xStock, NVIDIA xStock, and Nasdaq xStock, allowing investors to participate in market growth without purchasing traditional equities through brokerage accounts

Tokenized Real Estate. Fractional ownership of physical properties, including residential, commercial, and industrial real estate. RealT enables users to purchase shares in U.S. properties and earn rental income in crypto. Propy streamlines real estate transactions via blockchain, while Landshare opens access to income-generating properties for DeFi users. The key insight: you can now invest in global real estate markets without owning an entire property.

Land Ownership. Tokenization of land enables fractional ownership of both physical and digital plots, collective investment, and the use of land as collateral in DeFi. Platforms such as Parcel and Myco provide access to land-based and ecological assets through tokenized models. This sector highlights how the future of investing extends beyond traditional assets to include land as both a resource and an opportunity for collective ownership.

Category: MEME

In the world of cryptocurrencies, some projects begin as jokes—only to evolve into large-scale social and investment phenomena. This is exactly how meme tokens came to life: assets that have reshaped how we think about value, community, and the role of emotions in digital markets.

The first and most iconic example is Dogecoin, created in 2013 as a parody of Bitcoin. Its Shiba Inu dog mascot quickly became a recognizable internet meme, and an active community formed around the project. Dogecoin was widely used for online tipping and charitable initiatives and later gained global attention thanks in part to public support from Elon Musk. It proved that even a lighthearted project can have real-world impact.

Over time, other major meme tokens emerged, including Shiba Inu, Pepe, and Floki. Each built large and highly engaged online communities. Their success highlights a key insight: emotional connection and virality can sometimes outweigh pure technology.

Meme tokens are cryptocurrencies inspired by memes, jokes, or pop culture. Unlike traditional blockchain projects, they often lack complex technical infrastructure or clearly defined economic models. Their value is driven primarily by social media momentum, community engagement, and hype cycles. In many ways, these assets are powered more by culture and narrative than by code.

The primary driving force behind meme tokens is the community. It can rapidly amplify price movements, create trends, and capture market attention. At the same time, this dynamic makes meme tokens extremely

volatile. Prices can surge dramatically in a short period—and fall just as quickly. Most meme tokens are short-lived, and only a few evolve into lasting cultural symbols.

For newcomers, it's important to understand that meme tokens are high-risk assets. They function more as speculative experiments or forms of participation in internet culture than as long-term investment vehicles. Any capital allocation should be approached cautiously, using only funds you can afford to lose.

Ultimately, meme tokens represent a unique intersection of humor, community, and finance—clearly illustrating how emotions and social narratives can shape markets in the Web3 era.

Category: Artificial Intelligence

As of today, this segment stands out as one of the most dynamic and promising within the Web3 landscape. It brings together two defining ideas of our time—decentralization and intelligent automation.

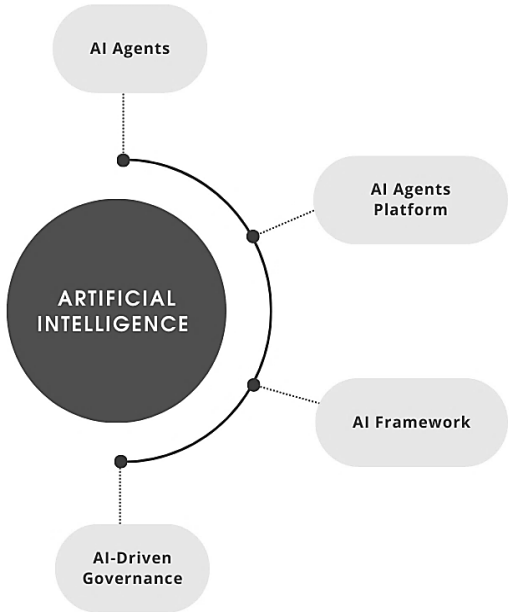


Diagram: Hierarchy and Subcategories within the AI

At this intersection, a new class of protocols is emerging, capable of transforming how we approach data analysis, ecosystem management, and interaction with digital environments.

Within this domain, several key subcategories are gradually taking shape:

AI Crypto Projects. Platforms and infrastructure solutions that combine machine learning algorithms with blockchain technology.

AI Agents. Autonomous or semi-autonomous digital entities capable of executing tasks in decentralized environments without constant human intervention. These agents can analyze markets, interact with smart contracts, manage assets, or act as personal assistants within Web3. They learn from data, adapt to changing conditions, and operate based on predefined rules or economic incentives. Over time, AI agents are evolving into fully-fledged "participants" in decentralized economies, operating alongside humans.

AI Agent Platforms. Environments where such agents can be developed, deployed, coordinated, and monetized. These platforms provide the infrastructure for agent-to-agent and agent-to-protocol interactions, along with built-in security mechanisms and incentive structures.

They enable the creation of entire ecosystems of autonomous agents that can collaborate or compete with one another. Examples include Autonolas and Fetch.ai, where agents are capable of executing complex decentralized tasks in real time.

AI Frameworks. Infrastructure solutions for building, training, and deploying AI models in decentralized environments. They address the critical issue of centralized data control by enabling secure data sharing and collaborative model training. These frameworks lay the foundation for an open data economy, where value is distributed among all participants. Ocean Protocol is a strong example of this approach, combining data infrastructure with economic incentives for data usage.

AI-Driven Governance. Focuses on applying artificial intelligence to the governance of decentralized autonomous organizations (DAOs). In this model, AI is used to analyze proposals, simulate outcomes, and optimize voting processes. This allows DAOs to operate more efficiently, adaptively, and strategically—especially at scale. Analytical platforms like DeepDAO, along with specialized AI DAO frameworks, are shaping the next generation of decentralized governance.

Part III: Decentralized Governance Model

In the traditional world, corporate governance is built on hierarchy: shareholders exert influence through a board of directors, decisions flow down to management, and then to employees. This model is well established but in Web3 it is gradually losing its monopoly.
In a decentralized environment, a different logic is emerging.

Decentralized Autonomous Organizations, or DAOs, introduce a model where decisions are made by the community, and the rules of interaction are embedded directly into code and algorithms. Smart contracts replace bureaucracy, and transparency becomes a baseline requirement rather than an exception.

It is important to understand that decentralized governance is not an end in itself—it is a tool that enables Web3 projects, funds, ecosystems, and shared resources to be managed without centralized control. Anyone holding tokens gains the right to influence the future direction of the project.

Digital organizations in Web3 function as a kind of operating system for protocols. They are responsible for strategic direction, resource allocation, accountability, code upgrades, and integration with other ecosystems. In essence, they transform collective community intent into concrete actions—not just declarations but executable outcomes.

Governance Structure in DAOs

The governance process in Decentralized Autonomous Organizations (DAOs) typically unfolds in several stages. First, a community member initiates a proposal. This may involve changing protocol parameters, approving a budget, or introducing a new strategic idea. The proposal then moves into a public discussion phase across forums, Discord channels, or specialized governance platforms.

After discussion comes the voting stage. The most common model is simple: one token equals one vote, although delegation mechanisms and alternative voting systems are increasingly being adopted.

If the proposal receives sufficient community support, it moves to the execution phase. In many cases, execution is fully automated through smart contracts in others, it is carried out by trusted operational structures such as multisig wallets.

This approach creates a universal model of decentralized governance that different communities can adapt to their own needs. The flexibility of this mechanism has led to the emergence of several primary types of DAOs, each applying shared governance principles within its own context:

1. **Investment DAOs**.

Early collective investment platforms where participants pool capital and jointly decide on investments in startups, NFTs, or digital assets.
Examples: The LAO, FlamingoDAO.

2. **Protocol DAOs**.

Platforms focused on managing the technical and economic parameters of DeFi protocols, including fees, smart contract upgrades, and overall ecosystem strategy.
Examples: Uniswap, Aave.

3. **Service DAOs**.

Communities of specialists across different fields who collaborate on client work and projects, enabling decentralized coordination and reward distribution.
Examples: Raid Guild, DZDAO.

4. **Grant DAOs**.

Entities responsible for funding open-source initiatives, startups, and research projects through collective allocation of community resources.
Examples: Gitcoin, MolchDAO.

5. **Meme-Culture DAOs**.

Communities formed around internet culture, memes, and ideas, combining social interaction with collective financial action.
Examples: ConstitutionDAO, Nouns DAO.

6. **Art DAOs**.

Organizations focused on collective management of art funds, NFT collections

and cultural programs, enabling new models of creative support.

Ultimately, DAOs are not a universal template. They are a flexible organizational tool that can be adapted to finance, technology, culture, or art—while preserving a core principle: collective, transparent governance without centralized control.

Evolution of DAO 2.0

The decentralized governance model is constantly evolving. As Web3 projects grow in scale and complexity, DAOs are gradually transitioning from experimental structures to more mature and structured forms.

A key development has been voting delegation, which allows community members to assign their voting power to active representatives. This improves decision quality and reduces passive participation. Another major direction is modular governance, where an organization is split into specialized sub-units responsible for areas such as finance, development, communications, or security. This makes governance more flexible and efficient.

A third element is decision automation, which takes into account not only token holdings but also the actual contribution of participants. This shifts governance power toward activity and impact rather than purely capital-based influence.

In addition, hybrid governance models are becoming increasingly important, combining elements of decentralized voting with centralized coordination. These approaches enable faster execution of critical decisions while preserving transparency and community involvement. At the same time, the evolution of DAOs comes with challenges, including coordination costs, difficulty in reaching consensus, and risks of low participation. These issues continuously push projects to refine governance mechanisms and improve incentive structures.

Together, these developments reflect the maturation and strengthening of the ecosystem, where decentralization is increasingly balanced with efficiency and accountability.

Part IV: Ethereum Ecosystem

In the world of digital assets, Ethereum holds a truly unique position. It is not just the second-largest cryptocurrency by market capitalization after Bitcoin. Ethereum is a full-fledged technological platform that has become the foundation for most key innovations in the Web3 space. Its influence on the development of the crypto industry has long gone far beyond the traditional understanding of blockchain.

Ethereum is an environment where new approaches to digital ownership, finance, community governance, and the internet as a whole are being formed. Thanks to smart contract functionality that executes without intermediaries, the platform opened the door to a new era of the internet. This era is built on decentralization, openness, and community-driven control rather than centralized institutions. At the same time, Ethereum sets the standards for decentralized application development and forms the infrastructure on which a significant portion of today's crypto economy is built. Its role is gradually evolving from an innovative platform into a foundational layer of the global digital financial system.

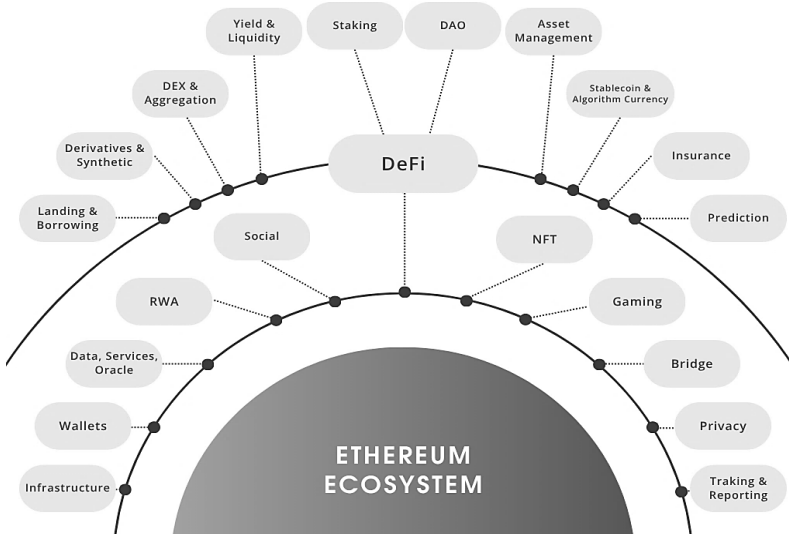


Diagram: Structure of the Ecosystem **| Ethereum**

It is on Ethereum that key sectors have emerged, such as:

- **Decentralized Finance (DeFi):** Financial services without banks
- **Non-Fungible Tokens (NFTs):** Digital art and collectibles
- **Blockchain gaming:** Ownership and earning models within game worlds
- **Real World Asset tokenization (RWA):** Bringing real assets into digital form

Together, these sectors form a multidimensional ecosystem where technology intersects with economics and social interaction.

The Ethereum ecosystem is not limited to its main network. A significant portion of activity has migrated to Layer 2 scaling solutions such as Optimism, Base, Arbitrum, and others. These solutions reduce transaction fees, increase throughput, and make decentralized applications more accessible to a broader user base. Although they are all unified under the Ethereum brand, the ecosystem itself remains diverse and highly heterogeneous.

Within the network, there are thousands of tokens serving different functions. Governance tokens grant voting rights in decentralized autonomous organizations, utility tokens provide access to services and protocols, and assets linked to real-world value act as digital equivalents of traditional financial instruments. They differ not only in purpose but also in economic models, volatility, issuance mechanisms, and use cases. At the same time, the vast majority of tokens circulating on Ethereum-based decentralized exchanges follow the ERC-20 standard—the network's native format that ensures interoperability and composability across protocols.

Collectively, the Ethereum ecosystem spans dozens of sectors and thousands of assets, each playing its own role within the digital environment. A powerful network effect—driven by global access to users and developers, combined with deep liquidity—creates a synergy that continuously accelerates platform growth and drives ongoing innovation.

In this chapter, we will focus on the most important sectors and the most influential assets representing the key segments of the Ethereum

ecosystem. From flagship DeFi protocols and Layer 2 scaling solutions to critical infrastructure projects, this overview will help you see Ethereum as a living, dynamic, and deeply interconnected network that forms the backbone of modern Web3.

Ethereum Stack: Base Layer

The Ethereum ecosystem is built on a modular architecture and is generally viewed as a technological stack, where each layer is responsible for a specific function within the network. This approach allows Ethereum to remain simultaneously secure, decentralized, and open to scaling.

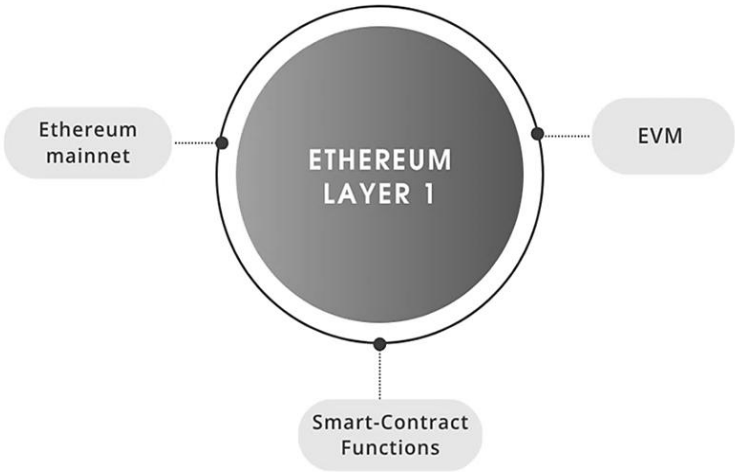


Diagram: Layer 1—Ethereum Ecosystem

Layer 1 (L1) is the foundational layer of the network and its technical core. This is where the unified state of the blockchain is maintained, transactions are validated, and smart contracts—the backbone of the entire ecosystem—are executed. Ethereum's security is ensured by a decentralized proof of stake consensus mechanism, in which thousands of validators from around the world participate.

This layer defines the network's operating rules, stores data, guarantees the immutability of transaction history, and serves as the foundation for all dApps, ERC-standard tokens, and protocols operating within the Ethereum ecosystem. The reliability of Layer 1 enables the

development of large-scale financial and application-layer solutions without compromising trust in the network.

Core Components of Layer 1:

- **Ethereum Mainnet**

The main Ethereum network, where all operations carry real economic value. This is where actual transactions are executed, tokens are exchanged, decentralized applications run, and user assets are stored. Unlike test networks, the mainnet is not designed for experimentation—every action has financial consequences, making network security and stability critically important.

- **Ethereum Virtual Machine (EVM)**

The Ethereum Virtual Machine acts as a global decentralized computer. It ensures that smart contracts execute consistently across all network nodes, regardless of their physical location. Thanks to the EVM, every smart contract runs in a predictable and deterministic way, which is a core requirement for trust in a decentralized environment.

- **Smart Contracts**

Software algorithms that automatically execute agreement conditions based on an "if-this-then-that" logic, without intermediaries. Their use cases span a wide range of applications: token transfers, NFT launches, DAO governance voting, and DeFi operations including lending, trading, staking, and liquidity management. Smart contracts are what transformed Ethereum from a simple blockchain network into a universal platform for building decentralized economic systems.

Ethereum Stack: Scaling Layer

Layer 2 (L2) solutions are scaling technologies built on top of the Ethereum main blockchain. Their purpose is to offload computation and transaction processing away from Layer 1. As a result, users benefit from significantly lower fees and higher transaction speeds while still inheriting the security and finality guaranteed by the Ethereum network.

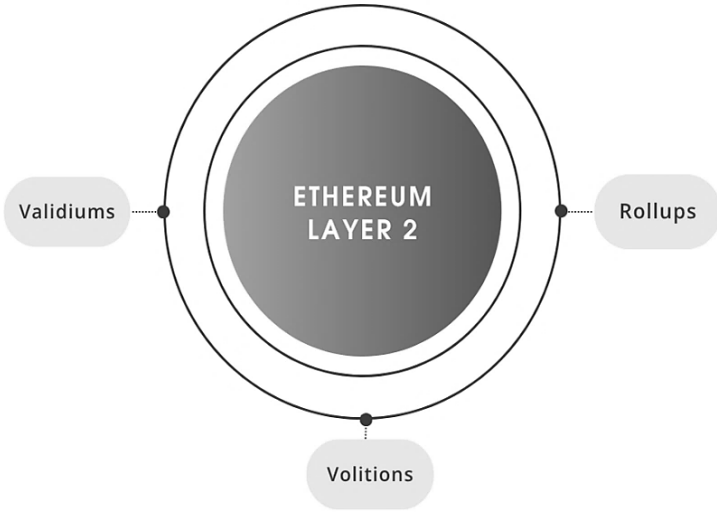


Diagram: Layer 2—Ethereum Ecosystem

The core role of Layer 2 is scaling without compromise. While the base layer focuses on security and decentralization, the second layer is responsible for throughput and economic efficiency. This architecture allows Ethereum to support thousands of decentralized applications while remaining an open platform for mass adoption.

Ethereum is often compared to global financial infrastructure due to its reliability and security. However, under heavy usage, the base layer cannot always process transactions quickly or cheaply. This is precisely why Layer 2 solutions exist—they operate on top of Ethereum, absorbing part of the network load without undermining its foundational security guarantees.

Core Components of Layer 2:

- **Rollups**

Most Layer 2 solutions are based on the rollup approach. Many transactions are processed off-chain, and only a compressed summary along with a validity proof is submitted back to Ethereum. This significantly reduces transaction costs and increases throughput while maintaining trust in the base layer.

- **Base**

A practical implementation of rollup technology is Base, a network built on the optimistic rollup model. In this system, transactions are assumed to be valid by default unless proven otherwise. If fraud is suspected, the system allows verification and correction of the state. Base combines low fees, high speed, and full compatibility with the Ethereum ecosystem, making it suitable for mass adoption.

- **Validiums**

Another scaling approach is validiums. Like rollups, they use cryptographic proofs to verify computation correctness but store transaction data off-chain instead of on Ethereum. This further reduces costs and increases scalability, though it introduces a trade-off in decentralization, as data availability depends on external infrastructure.

- **Volitions**

A flexible hybrid model that allows users to choose where data is stored. For high-security operations, data remains on-chain within Ethereum, ensuring maximum trust and protection. For less sensitive operations, data can be stored off-chain, reducing costs and increasing speed. This approach enables a dynamic balance between security and scalability depending on the specific use case.

Thanks to these solutions, Ethereum is gradually evolving from a network with limited throughput into a universal platform capable of serving millions of users. Layer 2 makes large-scale adoption of decentralized applications possible while preserving the core principles of security, openness, and decentralization that define the entire ecosystem.
This approach significantly reduces transaction costs and improves processing speed, making everyday blockchain interactions more practical for users and developers. It also enables the ecosystem to scale without compromising the integrity of the base layer, ensuring long-term sustainability and resilience. As a result, Ethereum can support increasingly complex applications while maintaining a strong foundation of trust and decentralization.

Ethereum Stack: Application Layer (dApps)

Layer 3 Ethereum represents the application layer of the stack and effectively serves as the face of Web3. This is where users first interact directly with blockchain technology in their everyday digital experience.
At this level, decentralized applications (dApps) operate, enabling users to engage with finance, digital assets, gaming, and communities—without needing to understand the underlying technical complexity of the network architecture.

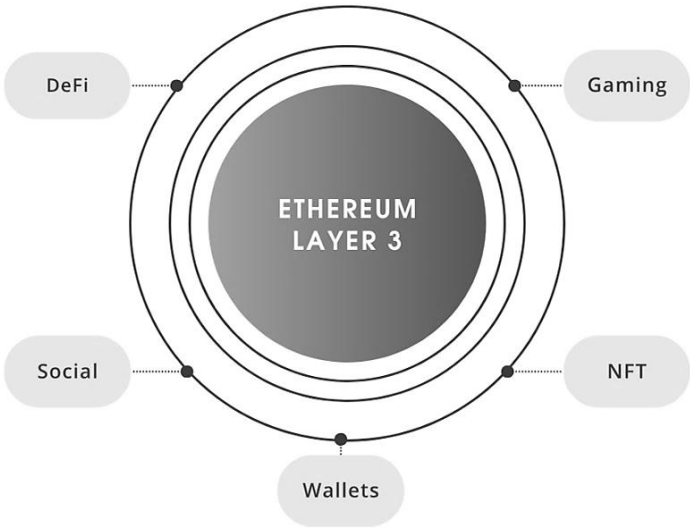


Diagram: Application Layer—Ethereum Ecosystem

Layer 3 leverages the security of Ethereum's base layer (Layer 1) and the scalability and speed of Layer 2 solutions, combining these capabilities into seamless, user-friendly services. As a result, blockchain ceases to be an abstract concept and becomes a practical tool that can be used intuitively and comfortably. Here, Web3 is no longer theory—it becomes a real, user-facing internet of the next generation.

The primary role of this layer is to deliver end-user services with high usability, low fees, and specialized functionality. Layer 3 is the most application-rich segment of the stack, as it is where technology takes

concrete form in financial protocols, digital marketplaces, gaming environments, and social platforms.

Within this layer, we find decentralized financial services, DAOs, NFT projects, gaming and virtual worlds, and access interfaces such as crypto wallets and decentralized exchanges. A critical role is also played by user experience solutions, including onboarding tools, digital identity management, and simplified interaction layers for complex protocols.

Collectively, these components form a living and dynamic ecosystem that enables new models of finance, digital ownership, and social interaction on the internet. The diversity of tools and services is what transforms Ethereum from a simple blockchain into a full-fledged innovation platform.

After reviewing the full stack, it becomes clear that Ethereum's true strength lies in its application layer. This is where technology meets real user needs and forms the foundation of a new digital space. In the next section, we will explore these components in more detail to understand how they interact and create a unified ecosystem.

Ethereum Stack: Infrastructure

Infrastructure within the Ethereum ecosystem plays a critical role in ensuring the stability, security, and accessibility of the network across all layers—from the base blockchain to end-user applications. It can be thought of as the invisible backbone that connects all system components and ensures their seamless coordination.

Thanks to infrastructure solutions, decentralized applications (dApps), DeFi protocols, and NFT platforms are able to send transactions, retrieve blockchain data, and respond to network events in real time. For example, services such as Infura or Alchemy allow developers to connect to the Ethereum network without running their own nodes, significantly simplifying product development and scaling.

Layer 2 solutions, particularly rollups, are tightly integrated with Ethereum's infrastructure. They interact with Layer 1 for data submission, transaction verification, and asset settlement, while still inheriting the

security of the base network. Additional layers of infrastructure include monitoring, security, and backup systems that ensure continuous application uptime even under complex or high-risk conditions. Understanding this layer provides a deeper view of how the Ethereum ecosystem actually operates.

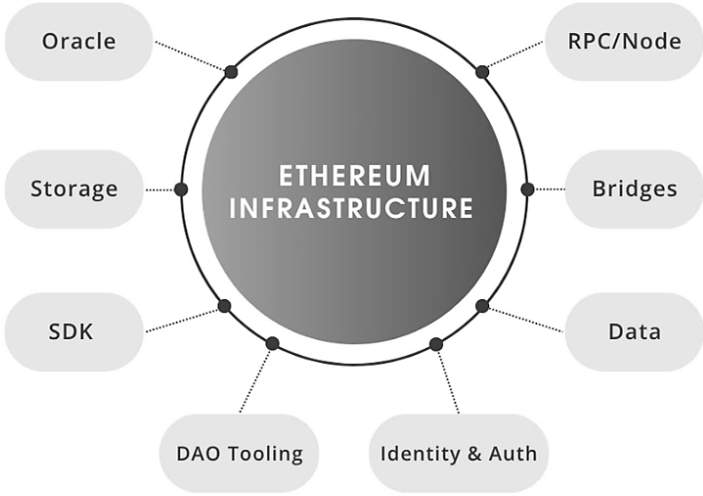


Diagram: Infrastructure Layer—Ethereum Ecosystem

Below are the core infrastructure components that power the network:

- **Oracles**

Oracles play a critical role in Ethereum by connecting the blockchain to the external world. Since smart contracts cannot directly access off-chain data, oracles provide information such as market prices, exchange rates, event outcomes, and other external inputs. The most well-known example is Chainlink, which uses a decentralized network of nodes to deliver verified data to smart contracts. This makes it a foundational component of most DeFi protocols in the Ethereum ecosystem.

- **RPC** i **Node**

RPC and node providers serve as the primary access points to the network for users and developers. They allow wallets, dApps, and services to

interact with Ethereum, send transactions, and read blockchain state without requiring users to run their own infrastructure. Providers such as Infura and Alchemy offer stable APIs and development tools for testing, deployment, and scaling applications, significantly lowering the technical barrier to entry.

- **Storage**

Ethereum is optimized for executing logic and storing financial data but it is not designed for large-scale data storage. This is why decentralized storage solutions such as IPFS and Arweave have become essential parts of the ecosystem. IPFS enables distributed file access via content hashing, while Arweave provides permanent on-chain data storage. These systems are widely used in NFT projects, where the token exists on Ethereum but metadata is stored off-chain.

- **Bridges**

Cross-chain interoperability solutions enable communication between Ethereum and other blockchains, allowing assets and data to move across networks. Solutions such as Wormhole and Synapse support a multi-chain ecosystem by enabling wrapped assets and expanding liquidity beyond a single chain. Bridges are a key enabler of multi-chain DeFi and universal Web3 application.

- **SDK та Developer Tools**

Developer tools form the technical foundation of Ethereum. Frameworks such as Hardhat, Truffle, and Ethers.js simplify writing, testing, and deploying smart contracts, while OpenZeppelin libraries provide secure and audited contract templates. These tools reduce development risk and make the ecosystem accessible to both beginners and advanced teams.

- **Data та Indexing**

Efficient application performance requires fast access to historical on-chain data. The Graph solves this by indexing Ethereum data and exposing it through structured APIs. This enables analytics dashboards and user interfaces without the need to process raw blockchain data directly.

- **Digital Identity та Authentication**

Digital identity projects simplify interaction within the Ethereum ecosystem. Ethereum Name Service replaces complex wallet addresses with human-readable names, while solutions like Sign-In with Ethereum enable authentication without centralized intermediaries. This forms the foundation of decentralized identity and improves trust between users and services.

- **DAO Tooling**

DAO tools enable collective governance of protocols, funds, and communities. Snapshot enables gas-free voting, Aragon provides DAO management frameworks, and Tally offers governance analytics and tracking. Together, these tools transform community intent into real governance actions within the Ethereum ecosystem.

Ethereum Stack: Decentralized Finance (DeFi)

Ethereum is the undisputed center of gravity in the decentralized finance (DeFi) sector. It is within its ecosystem that key next-generation financial protocols such as Uniswap, Aave, and MakerDAO first emerged and achieved mass adoption. On top of Ethereum, a fully functional financial infrastructure has formed—one that allows users to take out loans without banks, exchange assets without centralized exchanges, earn yield on liquidity without traditional intermediaries, and invest directly in digital projects.

As of 2025, Ethereum maintains its leadership in the DeFi sector, accounting for more than 60% of total value locked (TVL) across the market. The aggregate capital deployed in Ethereum-based DeFi protocols exceeds $40 billion, with the highest concentration in liquid staking, lending, and decentralized trading. Protocols such as Lido, Aave, and Uniswap form the core of this economic activity.

The transition of Ethereum to proof of stake, combined with the rapid development of Layer 2 solutions such as Arbitrum and Optimism, has significantly expanded real-world DeFi usage. The network has become

more accessible for both developers and users by reducing transaction costs and increasing interaction speed with protocols.

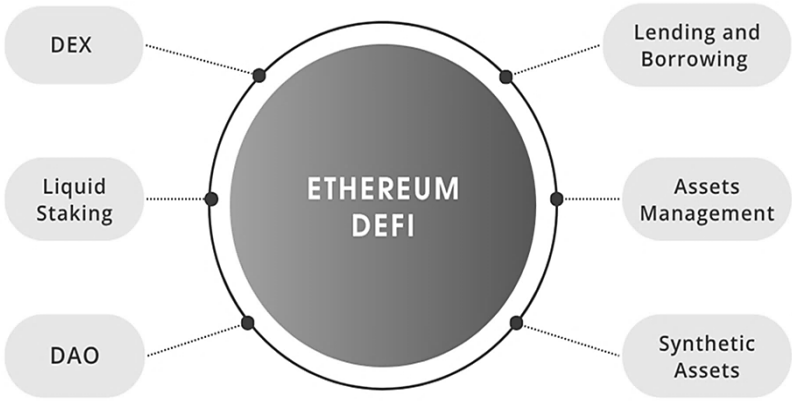


Diagram: Key Components of Decentralized Finance in Ethereum (DeFi)

The DeFi ecosystem on Ethereum continues to evolve. Alongside foundational financial services, new primitives are emerging—decentralized derivatives, tokenized real-world assets, and automated capital management strategies. This is paving the way for deeper integration with traditional finance. At the same time, the community remains the primary driving force: millions of users interact with protocols through intuitive interfaces, while the number of developers continues to grow steadily.

As a result, DeFi within the Ethereum ecosystem is no longer an experimental space. It has become a fully functional financial operating system—one that is increasingly understandable, efficient, and accessible.

Against this backdrop, a clear internal structure of DeFi has emerged, consisting of several core verticals: decentralized exchanges, lending and borrowing, liquid staking, synthetic assets, asset management, and decentralized governance (DAOs).

Below are the main DeFi directions, explaining how each works, what value it creates for users, and how together they form a unified financial system within Ethereum:

- **Decentralized Exchange (DEX)**

Decentralized exchanges introduced a new model of asset trading, enabling users to execute transactions without intermediaries. Within Ethereum, the key example is Uniswap.

Unlike traditional exchanges, Uniswap does not use an order book. Instead, trading occurs through liquidity pools provided by users. Participants deposit asset pairs (e.g., ETH and USDC) and earn fees from trading activity. Prices are determined algorithmically based on the ratio of assets within the pool.

Each transaction generates fees that are distributed among liquidity providers. This creates a built-in economic incentive to supply liquidity and ensures continuous market operation.

- **Lending & Borrowing**

Lending and borrowing platforms form the backbone of decentralized finance. These protocols allow users to supply assets as collateral or take out loans backed by crypto assets, with all processes automated via smart contracts.

Aave is one of the leading protocols in this segment. Users can earn yield by depositing assets or take loans against collateral. If the value of collateral falls below a threshold, the system automatically liquidates the position.

A special feature is flash loans—uncollateralized loans that must be repaid within a single transaction. They are widely used for arbitrage and advanced financial strategies.

- **Liquid Staking**

After Ethereum's transition to proof of stake, users gained the ability to earn rewards by staking ETH. However, traditional staking locks up assets, making them inaccessible during the staking period.

Liquid staking solves this limitation. It allows users to earn staking rewards while maintaining liquidity. The most prominent protocol in this category is Lido.

Here's how it works: users deposit ETH into Lido, which pools funds and delegates them to validators securing the Ethereum network. In return, users receive stETH, a token representing their staked ETH plus accumulated rewards. stETH remains liquid and can be freely used across the Ethereum ecosystem.

It can be traded, used as collateral for loans, supplied to liquidity pools, or integrated into other DeFi protocols. In this way, staking becomes an active financial instrument rather than a passive one.

Liquid staking demonstrates how Ethereum transforms core network functions into flexible financial tools—allowing users to secure the blockchain while maintaining full capital efficiency.

- **Synthetic Assets**

Synthetic assets provide access to financial instruments that were previously available only in traditional markets. These are blockchain-based tokens that track the price of real or digital assets such as the US dollar, gold, equities, or cryptocurrencies.

Importantly, owning a synthetic asset does not mean owning the underlying asset. Instead, users gain price exposure. If the underlying asset rises or falls, the synthetic token reflects that movement.

This enables trading derivatives, futures, and complex financial instruments without banks, brokers, or centralized exchanges. All operations are executed via smart contracts, making the system transparent and globally accessible.

A key protocol in this segment is Synthetix. It allows users to mint and trade synthetic assets known as Synths. The system is collateralized: users lock SNX tokens as collateral and mint assets such as sUSD or sETH.

Prices are continuously updated via decentralized oracles, ensuring accurate tracking of real-world values. This allows seamless asset swapping without order books or direct asset transfers.

In practice, users can shift exposure—for example, from Bitcoin to USD—in a single transaction without selling on an exchange. However, volatility risks remain, as sharp price movements can affect collateral ratios, requiring users to actively manage positions.

- **Assets Management**

As the Ethereum ecosystem evolves, users interact with multiple protocols simultaneously. Assets may be stored in wallets, staked, lent, or deployed in liquidity pools and NFTs. Over time, it becomes difficult to maintain a clear overview of one's portfolio.

Asset management platforms solve this problem by aggregating all holdings into a single interface. Tools like Zapper connect to user wallets and automatically display all assets and positions across Ethereum.
Users can view tokens, DeFi positions, staking rewards, liquidity pools, and NFTs in one place. This provides a holistic view of portfolio performance without manually navigating multiple platforms. Importantly, these tools do not custody or control funds—they simply read on-chain data and present it in an understandable format.

Thus, asset management makes DeFi more accessible and user-friendly, turning a complex infrastructure into a practical decision-making tool for both beginners and advanced users.

- **DAO (Decentralized Autonomous Organizations)**

DAOs are one of the core governance mechanisms within the Ethereum ecosystem. This model has become widely adopted and is now a standard for decentralized decision-making.
The idea behind DAOs is that protocols and communities can evolve without centralized leadership, executives, or corporations making decisions on behalf of users.

Within Ethereum, DAOs enable collective governance over protocol rules, financial parameters, and future development. Token holders can propose and vote on changes, including smart contract upgrades, fee adjustments, treasury allocation, and new feature launches.

Voting is transparent, and outcomes are either automatically executed via smart contracts or enforced as binding decisions. Since all rules are encoded on-chain, the process does not rely on trust in individuals or organizations.

As a result, DAOs make governance in the Ethereum ecosystem open and resilient. Decisions are made not by centralized entities but by the collective community of users and developers. This allows protocols to evolve organically with the network while preserving decentralization and trust.

Ethereum Stack: Gaming Universe

The gaming vertical in the Ethereum ecosystem is one of the most dynamic areas in Web3, combining blockchain infrastructure, NFTs, and a decentralized digital economy. Built on Ethereum, the first large-scale play-to-earn (P2E) projects—such as Axie Infinity, Gods Unchained, and Decentraland—introduced a new paradigm of digital ownership in gaming and laid the foundation for blockchain-based game economies.

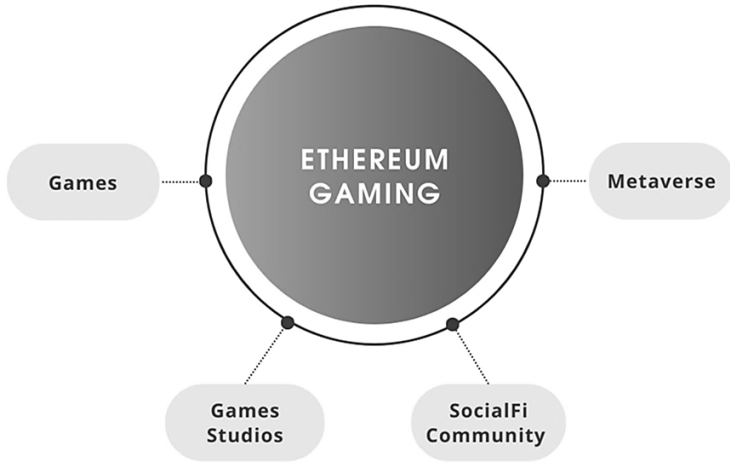


Diagram: Key Components of the Gaming Segment in Ethereum

A major shift in the Ethereum gaming sector came with the practical adoption of Layer 2 scaling solutions, which absorbed most in-game operations that were previously too expensive or too slow on Layer 1. Platforms such as Immutable X, Arbitrum, and zkSync enabled high-frequency gaming activity to move off the main chain while still inheriting Ethereum's security and final settlement guarantees. For players, this

means near-instant transactions when buying in-game items, upgrading characters, or participating in matches—without constantly worrying about gas fees. For developers, it enables the design of economies where frequent micro-actions are the norm rather than the exception.

On these infrastructure layers, games began to evolve beyond simple NFT collectibles. NFTs became fully functional in-game assets rather than static items, while native tokens started serving as coordination tools between players, marketplaces, and external protocols. As a result, Ethereum gaming is no longer an experimental niche. As of 2025, it consistently attracts millions of active users monthly and generates significant economic value at the intersection of gaming worlds, NFT markets, and on-chain financial systems.

- **Games**

Within the Ethereum ecosystem, blockchain games are evolving across several interconnected directions, each demonstrating how blockchain reshapes traditional game design and in-game economies.

Blockchain-native games, such as Dark Forest, are built almost entirely on smart contracts. This allows not only automated game logic but also full transparency of player actions and secure ownership of in-game assets. In this model, the game economy becomes autonomous: players can trade, interact, and make decisions without centralized servers, while every event is permanently recorded on-chain.

NFT-based games, such as Gods Unchained, emphasize digital ownership. Every card or item exists as a unique token that can be used in gameplay or freely traded and sold on external markets. This creates a strong sense of ownership, where asset value is secured directly by the blockchain rather than confined to a single game environment.

The play-to-earn (P2E) segment, represented by projects such as Illuvium, demonstrates how gameplay itself can become a source of income. Players earn tokens and NFTs through participation, creating long-term engagement and forming self-sustaining on-chain economies.

Together, these directions show that Ethereum is not just a platform for experimental gaming concepts but a full-scale infrastructure for Web3

gaming, where interaction, economy, and ownership are enforced directly through blockchain logic.

- **Metaverse**

Within the Ethereum ecosystem, metaverses represent a distinct layer where gaming mechanics, NFTs, decentralized governance, and on-chain economies converge. Standards such as ERC-721 and ERC-1155 enable the creation of unique or semi-fungible digital assets that users can collect, use in virtual environments, or trade externally.

Integration with DeFi protocols allows assets to be used in financial operations, while DAOs enable collective governance over virtual worlds and their development. Projects such as Decentraland and The Sandbox illustrate how Ethereum serves as foundational infrastructure for ownership accounting, internal marketplaces, and digital communities.

In this context, metaverses evolve from isolated game environments into autonomous digital economies that are deeply integrated with the broader Ethereum ecosystem.

- **Game Studio**

Game studios in the Ethereum ecosystem act as the core architects of digital worlds, translating blockchain capabilities into playable experiences and functional economies. They combine smart contracts, NFTs, and tokenized systems with traditional game design to build products capable of reaching mass audiences.

These teams are responsible not only for technical implementation but also for balancing gameplay and on-chain economics. Their decisions determine whether blockchain gaming remains a niche experiment or evolves into a mainstream entertainment category.

Key players include Sky Mavis, the creators of Axie Infinity, who built the EVM-compatible Ronin sidechain. Immutable, the studio behind Gods Unchained and Guild of Guardians on Immutable X, and Animoca Brands, which operates both as a developer and a major investor in Web3 gaming. These studios collectively shape Ethereum's long-term integration into the

global gaming industry, setting new standards for digital ownership and interaction in virtual environments.

- **SocialFi Community**

Within Ethereum's gaming ecosystem, SocialFi introduces a new model of digital interaction where community participation, social relationships, and user contributions gain direct economic value.

In this environment, not only physical assets but also intangible ones—such as trust, reputation, and attention—become tokenized. Smart contracts automatically reward active participants with tokens or NFTs, while DAOs enable transparent collective decision-making.

As a result, SocialFi transforms social engagement into a measurable economic resource that interacts with other ecosystem layers. This creates new incentives for community growth and strengthens the broader on-chain ecosystem. At the same time, the effectiveness of these models depends heavily on incentive design, user retention mechanics, and the ability to avoid speculative behavioral distortions.

Ethereum Stack: Non-Fungible Tokens (NFTs)

Within the Ethereum ecosystem, NFTs have become one of the core components that transformed an experimental concept into a fully

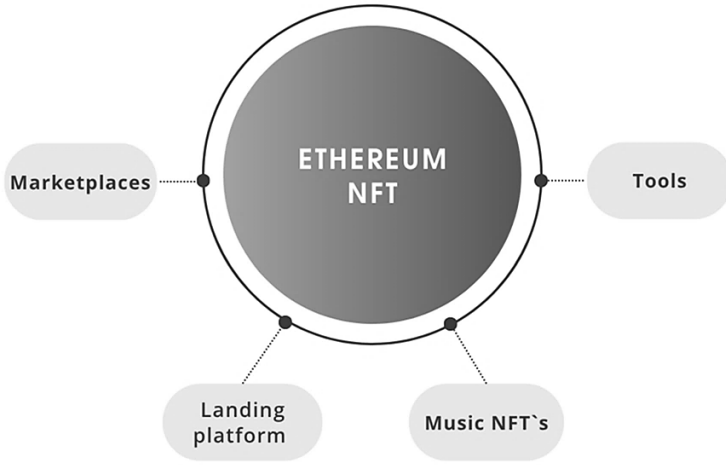


Diagram: Key Components of the NFT Segment in Ethereum

developed, multi-billion-dollar market. Digital ownership has gained real-world utility, and unique assets now benefit from reliable mechanisms for provenance and verifiable ownership. NFTs enable true ownership of one-of-a-kind digital assets—artworks, in-game characters, virtual land, music tracks, and collectibles.

Unlike fungible cryptocurrencies, each NFT has its own identity and transaction history. Ethereum's smart contracts, powered by ERC-721 and ERC-1155 standards, ensure authenticity and secure transfer of ownership without intermediaries. As a result, Ethereum has evolved into the foundational layer of digital culture, where creativity, ownership, and economics converge within a decentralized system.

- **Marketplace**

NFT marketplaces in the Ethereum ecosystem function as infrastructure hubs for asset circulation, transforming abstract tokens into liquid, tradable assets. These platforms facilitate the exchange of digital art, collectibles, gaming assets, music, and metaverse items. They establish price discovery, provide access to global audiences, and form the economic backbone of the NFT market.

They can generally be divided into three categories:

1. **General marketplaces**.

Support a wide range of NFT categories (OpenSea, Rarible).

2. **Specialized platforms**.

Focus on digital art or niche segments such as gaming assets or virtual land (Foundation, SuperRare).

3. **Aggregators**.

Combine listings from multiple marketplaces, enabling transparent price comparison and improved liquidity access (LooksRare).

- **NFT Tools**

NFT tools represent a suite of services and technical solutions that support creation, management, analytics, and secure interaction with NFTs. They form the application layer of the ecosystem, simplifying workflows for creators, developers, collectors, and investors. Their

evolution directly impacts market maturity and the adoption of new digital ownership models.

Core tool categories include:

1. **Minting services** (Zora, Manifold).

Enable NFT creation without requiring deep technical expertise, including smart contract deployment.

2. **Analytics platforms** (Nansen, Duna).

Provide insights into market trends, user behavior, and risk assessment based on on-chain data.

3. **Trading automation** (Blur, Genie).

Tools that allow users to react quickly to market movements such as listings, partnerships, and price shifts.

4. **Security services** (CertiK, Quantstamp).

Audit smart contracts and reduce exposure to fraudulent or vulnerable projects.

Together, these tools make the NFT market more accessible, transparent, and manageable. At the same time, effective usage requires a clear understanding of their limitations, associated risks, and security assumptions.

- **Landing platform**

Platforms such as NFTfi transform NFTs into financial assets by enabling users to take out loans using their tokens as collateral—without needing to sell them. This increases liquidity and reinforces the practical utility of digital ownership within DeFi.

- **Music platform**

Music-focused NFT platforms such as Sound.xyz, Catalog, and Audius provide artists with direct monetization channels while giving collectors access to royalties, resale opportunities, and exclusive benefits—such as gated content or private events.

As of 2025, the NFT market within the Ethereum ecosystem continues to expand in terms of minting volume, even amid declining prices and

reduced buyer activity. The total number of minted NFTs has surpassed 1.34 billion—approximately a 25% increase compared to 2024. At the same time, total sales volume has declined to $5.63 billion, with the average NFT price dropping to around $96.

This trend indicates a market in a phase of high token supply and broad distribution, while pricing and trading activity remain below peak-cycle levels. It highlights a key shift: NFTs are no longer just collectibles but have evolved into mass digital assets. Their economic value is increasingly driven by scale, on-chain ownership, and integration with broader financial mechanisms across the Ethereum ecosystem.

Ethereum Stack: Real World Assets (RWA)

The market for tokenized real-world assets within the Ethereum ecosystem represents a new model of interaction between physical assets and the digital economy. Thanks to Ethereum's technological maturity, deep liquidity, and strong institutional trust, traditional assets—such as bonds, credit instruments, real estate, and funds—can be transformed into on-chain tokens that circulate freely within blockchain markets.

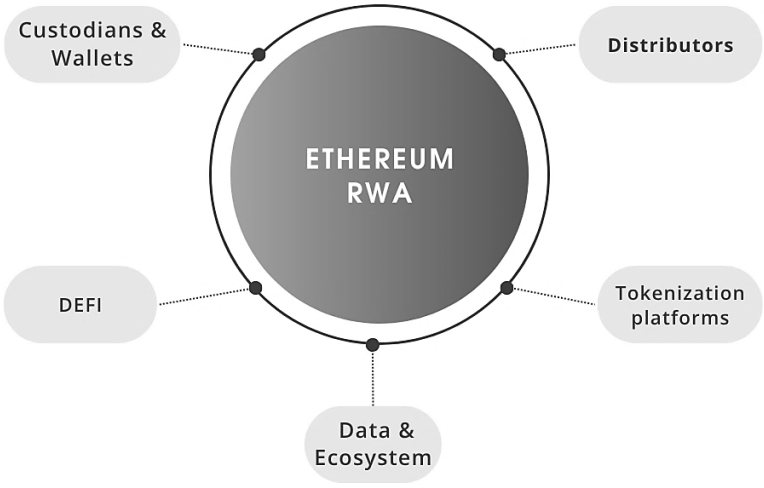


Diagram: Key Components of the RWA Segment in Ethereum

Ethereum enables transparency, security, and automated ownership management through smart contracts. This allows both investors and financial institutions to retain control over real-world assets while simultaneously deploying them within decentralized financial systems. A key driver of Ethereum's dominance in this sector is its ability to convert on-chain liquidity into real purchasing power, creating a continuous inflow of capital into tokenized asset markets.

Leading financial institutions—including JPMorgan, Goldman Sachs, Santander, Société Générale, and BlackRock—have chosen Ethereum as the foundational infrastructure for their RWA initiatives. This validates its role as a bridge between traditional finance and decentralized systems, increasing liquidity for conventional assets and expanding access to global markets in a more open and programmable format.

- **Distributors**

Distributors play a critical role in the tokenization of RWA. They enable the efficient issuance, distribution, and trading of tokenized assets among institutional and large-scale investors. It is distributors who bridge traditional finance with blockchain, enhance liquidity, and ensure regulatory compliance.

It is worth highlighting Securitize—one of the early pioneers in building tokenization infrastructure for major players such as BlackRock and Apollo. As of 2025, it holds over $4 billion in tokenized assets. Other rapidly evolving platforms include Ondo Finance, Backed Finance, and Matrixdock, all of which facilitate the efficient distribution of financial instruments within the RWA space.

- **Tokenization platforms**

Tokenization platforms create digital tokens that represent real-world assets—real estate, bonds, and debt instruments. They are responsible for the technical implementation of tokens, legal compliance, and asset management.

If tokenization platforms create the assets, distributors ensure their accessibility to investors and organize the investment process. Together,

they form an ecosystem in which the tokenized asset market operates efficiently and transparently.

- **DeFi**

Decentralized Finance integrates RWA tokens into its native mechanics, allowing users to earn yield or use assets as collateral for lending. This creates a secondary market and significantly enhances liquidity.

Key players in this segment include Ondo Finance, Centrifuge, Maple Finance, and Spark Protocol.

- **Custodian & Wallets**

In the RWA space, trust and security are paramount. Custodians are licensed entities that safeguard tokenized assets in full compliance with regulatory and legal standards. Key players include Fireblocks, Anchorage Digital, and Coinbase Custody.

Wallets are technological solutions—either mobile applications or hardware devices—used for storing digital assets. Their core value lies in giving users full control over their assets.

Among institutional-grade solutions, MetaMask Institutional stands out by offering custodial APIs for institutions. Gnosis Safe provides multi-signature management for DAOs and funds and Ledger Enterprise focuses on hardware-based key storage with maximum security.

- **Data**

RWA data services collect, aggregate, and structure information on tokenized assets, increasing both market transparency and efficiency. Within the Ethereum ecosystem, resources like RWA.xyz specialize in analytics and market trends.

Global players such as Moody's and Morningstar contribute to risk assessment and help strengthen investor confidence. Platforms like Security Token Market provide liquidity, regulatory compliance, and transparency in the trading of tokenized securities.

The pivotal role of Ethereum is driven by its combination of technological reliability, mature infrastructure, and a high level of trust from institutional participants. Regulatory compliance, smart contract

standardization and deep integration with DeFi make Ethereum the foundational layer for migrating traditional financial assets into the blockchain environment.

The growth of RWA investment on this platform underscores not only its stability but also its strategic importance in shaping the future architecture of decentralized finance.

As of 2025, Ethereum maintains a dominant position in the real-world asset tokenization segment, accounting for approximately 81% of the global RWA market. In 2024 alone, the volume of tokenized assets surpassed $14.9 billion, reflecting nearly 60% year-over-year growth. With over 97,000 token holders and more than 205,000 unique addresses actively interacting with RWA, the ecosystem demonstrates both maturity and scale.

Ethereum Stack: SocialFi

In the previous chapter on gaming, SocialFi was already mentioned as a tool for community building and user activity monetization. However, its role within the Ethereum ecosystem is far broader.

This sector introduces a new layer of internet architecture—one where social connections, user-generated content, and economic value belong not to platforms but to the users themselves. This is not just a new category of applications, it represents a fundamental shift in how people interact in digital environments.

SocialFi, as a distinct vertical, merges social networks with decentralized financial mechanisms, bringing familiar forms of communication and self-expression into the on-chain space. Within the Ethereum ecosystem, this segment is evolving rapidly thanks to mature smart contracts, robust infrastructure, and a large user base seeking control over their data, social interactions, and income streams.

Here, reputation, community participation, and content creation are directly tied to economic incentives, while the rules of interaction are enforced in code rather than hidden within platform algorithms.

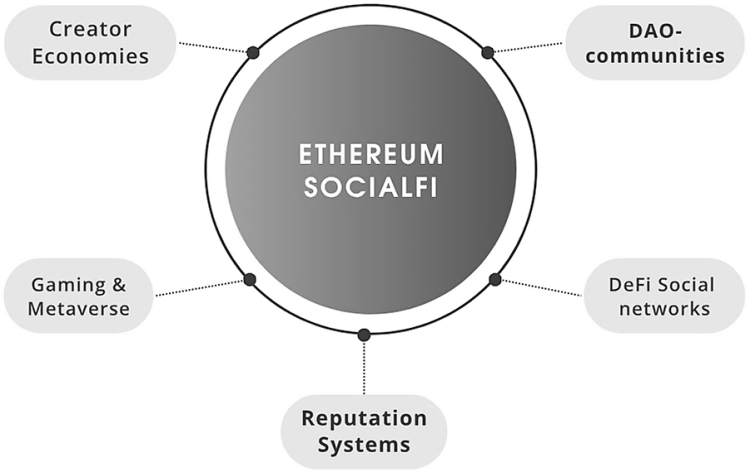


Diagram: Key Components of the SocialFi Segment in Ethereum

The potential of SocialFi extends far beyond monetization or financial mechanics. In combination with gaming and other Web3 platforms, it forms a new model of digital interaction—where communication, reputation, community contribution, and ownership become fully-fledged on-chain assets. Within Ethereum, this translates into environments that function as self-governing systems, where rules, value creation, and evolution are defined by the community rather than centralized intermediaries.

- **Creator Economies**

SocialFi is shaping a new economic model for content creators. Influencers, artists, musicians, educators, and researchers can now directly monetize their work and engage with their communities—without intermediaries.

This is enabled through social tokens based on the ERC-20 standard, which can grant access to exclusive content, premium features, or governance participation. NFTs, in turn, represent unique digital assets sold directly to audiences. You are no longer just consuming content—you are becoming a stakeholder in it.

The result is an interaction-driven economy, where value is co-created and rewards are distributed across all participants in the ecosystem.

Within this vertical, several approaches have emerged:

1. **General platforms** (Farcaster, P00LS).

Enable content creation, community management, and the monetization of social activity.

2. **Music platforms** (Sound.xyz).

Allow artists to release music NFTs and engage directly with their audience, enabling fans to own shares of tracks and support creators directly.

3. **Video platforms** (Livepeer).

Provide decentralized infrastructure for video streaming monetization.

4. **Educational environments** (POAP, NFT-Certificate).

Offer access to knowledge and learning materials through tokenized participation and ownership

5. **Next-generation advertising models** (Brave, BAT).

Projects that reward users for their attention and engagement, in contrast to traditional platforms where only content creators are compensated.

Together, these approaches demonstrate how SocialFi within the Ethereum ecosystem is transforming social activity and content into on-chain resources with measurable economic value.

- **DeFi Social Networks**

Decentralized social networks within the Ethereum ecosystem are redefining the foundation of online interaction: user data and social graphs are stored not on corporate servers but on the blockchain.

Users own their decentralized identity and social graph, which can be ported across multiple applications. This significantly reduces the risks of censorship and manipulation.

A flagship example of this approach is Lens Protocol, which has become a foundational layer for many SocialFi applications within Ethereum.

- **DAO Communities**

DAO communities are redefining the logic of social platform governance, transforming users from passive audiences into active co-owners. In

these models, governance token holders directly vote on key decisions related to moderation, budget allocation, and strategic development.

Snapshot has become one of the core tools in this space, enabling DAOs and SocialFi projects to make decisions transparently and without centralized intermediaries—embedding the collective will of the community into on-chain processes.

- **Gaming & Metaverse**

The integration of SocialFi with gaming and metaverse environments is creating new socio-economic systems where user interaction goes far beyond content consumption.

In Ethereum-based games, players form DAO guilds, collectively own NFT assets, and make strategic decisions about the development of virtual worlds.

- **Reputation System**

A critical component of SocialFi is reputation systems, which transform user activity into long-term, on-chain trust capital.

Actions on the blockchain shape a user's reputation, often recorded through soulbound tokens—non-transferable assets that serve as proof of contribution, identity, and reliability. Ethereum Name Service provides user-friendly, unique on-chain identities, while Gitcoin Passport aggregates both on-chain and off-chain signals, helping mitigate Sybil attacks and build trust without centralized verification.

Together, these mechanisms illustrate how SocialFi within the Ethereum ecosystem is establishing new rules for social coordination and digital identity.

Overall, SocialFi within Ethereum reflects a fundamental shift in the logic of online interaction, where centralized platforms are gradually giving way to decentralized, community-governed environments.

In this model, users own their digital identities, content, and the economic value they create—rather than handing it over to platforms. Ethereum serves as the technological foundation of this transformation, combining smart contract security, the flexibility of ERC-20, and NFT

standards, blockchain transparency, and scalability through Layer 2 solutions.

A mature DeFi infrastructure and a global developer community are accelerating the adoption of SocialFi—turning users from targets of monetization into active participants in the digital economy.

Ethereum Stack: Artificial Intelligence

Within the Ethereum ecosystem, the artificial intelligence segment is evolving at a rapid pace, combining machine learning tools with decentralized architecture, transparent rules, and user sovereignty.

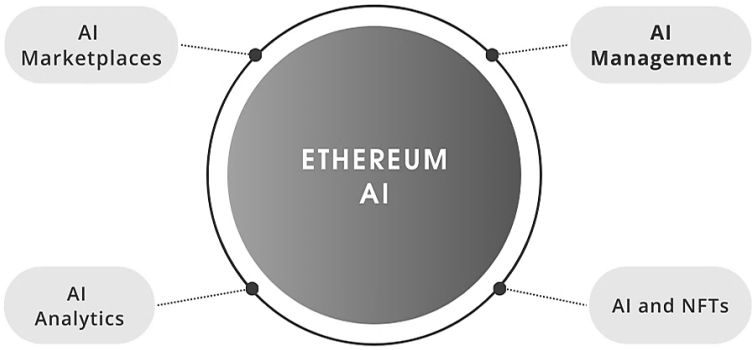


Diagram: Key Components of the AI Segment in Ethereum

Ethereum creates an environment where AI systems can operate without centralized control, with their logic and economic incentives embedded directly into smart contracts. This enables the development of models where access to data, computational outputs, and rewards for algorithmic performance are distributed openly—with a strong emphasis on security and privacy. This fundamentally distinguishes Ethereum's approach from traditional centralized AI platforms.

- **AI Marketplace**

AI marketplaces create an open environment where developers can publish, access, and monetize models and datasets without relying on centralized intermediaries. Smart contracts handle reward distribution,

licensing and intellectual property protection—making the AI services economy transparent and verifiable.

A notable example of this approach is SingularityNET, which is building an open economy of AI agents and services within the Ethereum blockchain environment.

- **AI Management**

Machine learning algorithms are increasingly used to analyze on-chain data, simulate governance outcomes, and forecast the impact of strategic decisions—reducing DAOs' reliance on manual processes.

This enhances the efficiency and adaptability of decentralized governance, particularly in complex organizations with large participant bases. Projects like DAOstack are exploring how automated systems can augment collective decision-making without compromising decentralization.

- **AI Analytics**

Artificial intelligence is also playing a growing role in DeFi analytics. By processing large volumes of on-chain data, AI can identify market patterns, assess risk, and support more informed investment strategies.

Platforms like Numerai demonstrate how the convergence of decentralized finance and machine learning can produce collective market prediction models, where data scientists worldwide compete and collaborate within a unified on-chain economy.

- **AI & NFT**

A distinct dimension emerges at the intersection of AI and NFTs, where dynamic digital content evolves based on user actions or external conditions.

Programmable NFTs, as seen in projects like Async Art, transform digital art into living systems—capable of real-time evolution and far beyond static digital objects.

In summary, artificial intelligence within the Ethereum ecosystem is not merely a set of tools—it serves as a foundational layer for building decentralized, autonomous, and adaptive systems.

The convergence of blockchain and AI is shaping a new digital infrastructure where algorithms operate transparently, economic incentives are encoded directly into protocols, and both control and value creation remain in the hands of the community.

Ethereum Stack: Stablecoins

Within the Ethereum ecosystem, stablecoins have become a foundational layer of the digital economy. Their core function is to reduce volatility by providing assets with a fixed value, most commonly pegged to the US dollar. Because of this, they have evolved into a universal medium of exchange across DeFi, real-world asset (RWA) tokenization, DAO governance, payment systems, gaming, and SocialFi.

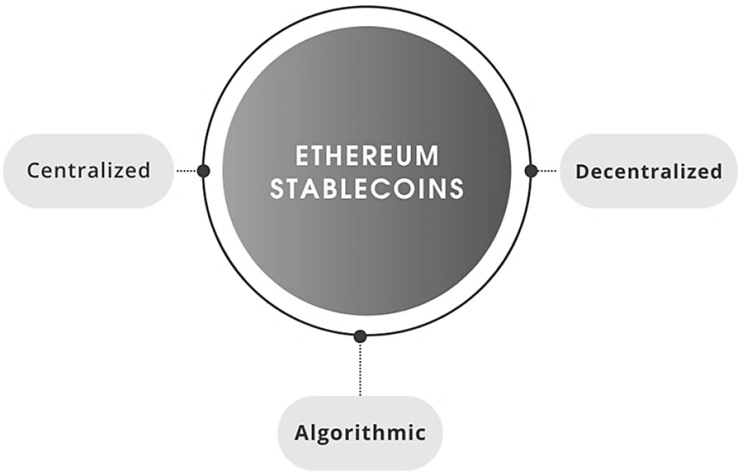


Diagram: Key Components of the Stablecoins Segment in Ethereum

Within Ethereum, several stablecoin models have emerged. They differ in their collateral structures and mechanisms for maintaining price stability, which directly influences their level of decentralization and resilience.

- **Centralized**

Fiat-backed stablecoins issued by companies holding bank reserves. This category includes USDC by Circle, known for its regulatory compliance focus

USDT by Tether, the most liquid stablecoin globally, and PYUSD by PayPal, which bridges traditional finance with blockchain infrastructure.

- **Decentralized**

Crypto-collateralized stablecoins with no centralized issuer. The most widely used examples include DAI (MakerDAO), GHO (Aave), and RAI (Reflexer).

- **Algorithmic**

Models in which stability is maintained through automated supply adjustments. Notable examples include FRAX, which uses a hybrid architecture, and sUSD from Synthetix.

In DeFi, stablecoins serve as the primary source of liquidity: they form trading pairs on decentralized exchanges, are widely used in lending protocols, and underpin yield-generating strategies. In the RWA segment, they function as the settlement and store-of-value layer for tokenized bonds, funds, and credit instruments.

For DAOs, stablecoins act as the financial backbone of treasuries, enabling predictable budgeting and funding of initiatives without exposure to market volatility. In gaming, Web3, and SocialFi applications, they power microtransactions, in-app purchases, and creator–community economic interactions.

The stablecoin infrastructure on Ethereum is rapidly scaling through Layer 2 solutions and cross-chain protocols, reducing transaction fees and increasing settlement speed. At the same time, tools for risk management and automated hedging strategies continue to evolve.

As of early 2025, Ethereum remains the leading network for stablecoins: approximately $67 billion in USDT and $35 billion in USDC are circulating on the network. Monthly transaction volumes exceed $800–850 billion, with more than 600,000 active addresses per day. Annual turnover grew from $1.9 trillion in February 2024 to $4.1 trillion in February 2025.

In conclusion, stablecoins on Ethereum represent far more than a digital representation of the US dollar. They form the core financial layer of Web3, bridging traditional financial systems with decentralized economic

infrastructure. Thanks to them, blockchain has moved beyond an experimental environment and has become a fully functional settlement layer for payments, value storage, and the development of new financial services.

Stablecoins provide predictability in a volatile environment, enhance market liquidity, and simplify interactions between users, protocols, and institutional participants. They act as a universal bridge between fiat economies and digital assets, lowering entry barriers and accelerating global capital flows.

Ultimately, stablecoins make blockchain-based payments not only possible but truly scalable, efficient, and suitable for everyday use—laying the groundwork for a new financial system that operates without borders, intermediaries, or time constraints.

1. Layer of Blockchain Project Development

The first and most important step is understanding which infrastructure layer a project is built on within Ethereum or any other network. This determines its architecture, strategic direction, scalability potential, and readiness for integration with real-world businesses and the traditional economy.

2. Functional Categories of Projects

Qualitative evaluation begins with identifying the functional role of a project. For ecosystem-native solutions, this helps determine their systemic importance within the network. For independent or multi-ecosystem projects, the key focus shifts to market demand, integration potential, category scale, and long-term relevance within the Web3 landscape.

3. Ecosystem Scale and Structure

The next step is assessing the ecosystem in which a project operates. The presence of infrastructure layers, DeFi protocols, stablecoins, wallets, RWA services, oracles, and bridges helps define its specialization, technological maturity, scalability, and attractiveness for both developers and institutional participants. A well-developed ecosystem significantly increases the likelihood of long-term project sustainability.

4. Ecosystem Context and Positioning

Analyzing a single ecosystem also serves as a foundation for broader cross-ecosystem comparison. It allows for the evaluation of strategic relevance, innovation capacity, and the ability to support key market narratives—such as DeFi, RWA, AI, SocialFi, and digital identity—while continuously adapting to shifts in the global Web3 landscape.

4

CHAPTER

Digital Integration

2025 marks the inflection point when real integration began at the intersection of technology and practice: code from smart contracts is turning into agreements, transactions into salaries, and tokens into assets used in everyday life.

To understand the nature of modern blockchain adoption, it's worth stepping back a few decades—to the moment when computers first began connecting into networks. This wasn't just a technological breakthrough it was the beginning of a new era of interconnected systems.

In the late 1970s and early 1980s, Robert Metcalfe, one of the creators of Ethernet, formulated a principle that later became known as Metcalfe's Law: the value of a network grows proportionally to the square of its number of users. This law explains why, in their early stages, innovations often seem unnecessary or too expensive—but once they reach critical mass, their utility expands exponentially.

At that time, Ethernet cards—required to connect personal computers to a network—were perceived as a niche and largely impractical solution due to the lack of developed network infrastructure. We are observing a similar phase today in the realm of blockchain and digital assets. The new infrastructure is not yet universally recognized for its value however, each new participant strengthens the network, gradually moving it from an experimental stage to mass adoption.

In a broader sense, adoption is not merely about technological connectivity—it represents a comprehensive transformation of economic, organizational, and social processes. It encompasses a shift in business logic, financial instruments, and approaches to asset allocation and management through the use of digital technologies. At the same time, operational value chains, payment systems, and coordination mechanisms are being reimagined to enhance efficiency and flexibility. A critical component is the restructuring of organizational frameworks, roles, and responsibilities—particularly relevant for banks, government institutions, and large corporations. Equally important is the integration of digital assets into corporate and national investment and development strategies, alongside the establishment of a regulatory framework that formalizes these new practices within the legal system through regulatory mechanisms, standards, and legislation.

This transformation does not occur in isolation or all at once. It unfolds gradually and asynchronously, spanning multiple layers of economic and social interaction. At the state level, it manifests in the formation of regulatory environments and the legal recognition of digital assets. At the company and institutional levels, the process is reflected in the adaptation of internal policies, operating models, and strategies to new technological realities. In parallel, societal perceptions are evolving, as digital assets and decentralized services become normalized and increasingly integrated into everyday financial and social practices. It is

the convergence of these changes creates the conditions for sustainable and scalable adoption.

We are already witnessing how Web3 technologies, smart contracts, cryptocurrencies, NFTs, and digital identities are moving beyond a narrow technical niche and beginning to influence finance, culture, art, real estate, logistics, and community governance. This signals a transition from an early experimental phase to a stage of mass adoption—one that continues to accelerate over time.

Legitimization plays a pivotal role in this process, as it shifts technologies from an experimental environment into a fully recognized economic segment. The formation of trust and stability occurs simultaneously at the state, corporate, institutional, and societal levels, creating the foundation for long-term growth.

As with Ethernet, the adoption of digital assets is not instantaneous. It begins slowly—often met with skepticism—progresses through a phase of gradual user accumulation, and ultimately enters a stage of explosive growth. At that point, digital tools become an inseparable part of everyday life.

That is why the concept of adoption is central to understanding when and why new technologies begin to reshape reality. If Metcalfe's Law once explained the rapid growth of the internet, today it helps us understand why blockchain and digital assets have the potential to become the foundational infrastructure of the digital economy in the years ahead.

Bitcoin's Path to Mass Adoption

- **2008**

The Bitcoin White Paper was published by an individual or group operating under the pseudonym Satoshi Nakamoto. The document introduced the concept of a decentralized digital currency enabling peer-to-peer transactions without banks or other trusted intermediaries.

- **2009**

Satoshi Nakamoto mined the first block of the network—the genesis block (Block 0). Its Coinbase message included a headline from *The Times* referencing government bank bailouts, underscoring Bitcoin's vision as an alternative to the centralized financial system.

- **2010**

The first known real-world Bitcoin transaction took place: Laszlo Hanyecz purchased two pizzas for 10,000 BTC. At the same time, the first cryptocurrency exchanges emerged, including Mt. Gox, laying the foundation for market-based price discovery. The approximate value of BTC at the time was around $0.05.

- **2011**

Bitcoin saw its first large-scale practical use case as a payment method on the online marketplace Silk Road. Rising demand drove the price of BTC from under $1 to over $31, attracting the attention of investors and global media.

- **2012**

The first Bitcoin halving occurred, establishing the four-year cycle of mining reward reduction and becoming a core element of the network's deflationary economic model.

- **2013**

The first major crypto investment funds emerged—Pantera Capital and Grayscale Investments—opening access to BTC for institutional investors. Bitcoin's market capitalization surpassed $1 billion for the first time, solidifying its status as a financial asset.

Michael Saylor, CEO of StrategyB: *"Bitcoin's days are numbered. It's only a matter of time before it suffers the same fate as online gambling." (2013)*

- **2014**

The collapse of Mt. Gox following a massive hack resulted in the loss of approximately 850,000 BTC. Along with the shutdown of Silk Road, this intensified skepticism about Bitcoin's security and long-term viability.

Warren Buffett, CEO of Berkshire Hathaway: *"Stay away from it. It's essentially a mirage." (2014)*

- **2015**

In the U.S., Grayscale Investments launched the Bitcoin Trust (GBTC) on the OTCQX market—the first investment product providing BTC exposure through traditional financial infrastructure.

- **2017**

CME Group launched the first regulated Bitcoin futures contract, opening the market to large institutional players. CBOE also introduced futures but later discontinued trading.

Larry Fink, CEO of BlackRock: *"Bitcoin is an index of money laundering." (2017)*

- **2018**

Following the peak of 2017, the crypto market entered a deep correction: Bitcoin's price dropped from nearly $20,000 to around $3,200. Widespread investor losses and startup closures reinforced skepticism about the industry's long-term viability.

- **2019**

Gradual institutionalization began: financial firms tested blockchain solutions, and the first regulated crypto products appeared in the U.S. and Europe.

Donald Trump, U.S. President: *"I am not a fan of Bitcoin and other cryptocurrencies, which are not money, whose value is highly volatile and based on thin air." (2019)*

- **2020**

MicroStrategy became the first public corporation to adopt Bitcoin as its primary reserve asset, pioneering a new corporate treasury model.

- **2021**

El Salvador recognized Bitcoin as legal tender—an unprecedented move at the sovereign level. In the U.S., the BITO futures ETF began trading on the New York Stock Exchange, while BTC reached an all-time high of approximately $69,000.

Jerome Powell, then Chair of the Federal Reserve: *"Bitcoin is highly volatile and not a useful store of value it's not backed by anything." (2021)*

- **2022**

The market experienced a severe crisis: Bitcoin's price fell from over $60,000 to approximately $18,000. The collapse of FTX, along with the bankruptcies of Celsius Network and Voyager Digital, led to a significant loss of trust and tighter regulatory scrutiny.

- **2023**

Institutional interest rebounded. BlackRock, Fidelity Investments, and others filed for spot Bitcoin ETFs. Bitcoin increasingly began to be viewed as a strategic macro asset.

Jamie Dimon: *"Bitcoin is a hyped-up fraud." (2021)*

- **2024**

On January 10, 2024, the U.S. Securities and Exchange Commission approved 11 spot Bitcoin ETFs—a historic turning point for the market. Bitcoin became integrated into the traditional financial system, accessible through conventional exchange-traded instruments.

Jerome Powell: *"It's like gold, only virtual gold. It's essentially a competitor to gold." (2024)*

Larry Fink: *"My view five years ago was wrong. I now consider Bitcoin legitimate." (2024)*

- **2025**

Bitcoin entered a new phase of sovereign-level adoption. Several U.S. states—including Pennsylvania, Florida, Texas, Ohio, and Alabama—announced the creation of crypto reserves. These initiatives involve using Bitcoin as a store of value, an inflation hedge, and a tool for reserve diversification.

At the same time, a number of countries—including Brazil, Argentina, Japan, Czech Republic, and Ukraine—initiated public discussions on incorporating Bitcoin into national financial strategies, signaling its gradual recognition as a macroeconomic asset.

Michael Saylor, CEO of StrategyB: *"Bitcoin is more complex, stronger, and smarter than any money that preceded it." (2025)*

Donald Trump, U.S. President: *"Together, we will make America the undisputed Bitcoin superpower." (2025)*

The retrospective of Bitcoin adoption shows that its evolution is the result of sustained technological, economic, and institutional integration. Initially confined to a narrow circle of enthusiasts and perceived as a fringe experiment, it has gradually transformed into a fully recognized financial asset through the growth of users, infrastructure, exchanges, and regulatory clarity.

Each crisis—from the collapse of Mt. Gox to deep market drawdowns—served as a stress test, strengthening the resilience of the ecosystem. Institutional investors, public companies, and government entities have increasingly integrated Bitcoin into their capital allocation and reserve management strategies. The launch of exchange-traded funds and the establishment of sovereign crypto reserves signal a transition from an experimental phase to systemic adoption.

Today, Bitcoin is increasingly positioned as a scarce digital asset, shaping macro-financial frameworks and sovereign economic strategies. Its trajectory illustrates how public perception evolves—from skepticism to institutional validation. As participation and integration continue to expand, Bitcoin is solidifying its role as a foundational pillar of the 21st-century financial system—confirming that the adoption curve is not only advancing but also irreversible.

Part II: Trends on the Path to Adoption

Bitcoin's journey from concept to a global financial asset has unfolded through several key stages, each progressively expanding adoption and deepening market understanding of its value proposition. The first measurable signal of interest was mining activity. Between 2009 and 2012, mining remained highly decentralized and accessible to virtually any personal computer owner, with no clear country-level leaders. The growth of global mining participation became the first tangible indicator of Bitcoin's traction and its gradual integration into economic processes. Moreover, mining served as the initial mechanism through which certain states began engaging with the crypto ecosystem—as a means of accumulating Bitcoin and forming early-stage digital reserves.

Starting in 2013, with the emergence of ASIC miners, an industrialized mining model began to take shape. China quickly assumed a dominant position, driven by low-cost electricity, large-scale hardware manufacturing, and mature infrastructure. This trend persisted into the early 2020s, when the geographic distribution of mining began to shift. The United States, Canada, and Kazakhstan scaled their hash rate capacity, while China's 2021 mining ban triggered a mass relocation of miners. This transition enabled the United States to emerge as a new global mining hub and reinforce its leadership position.

New market participants—including Germany, Malaysia, and Ukraine—began developing their own crypto infrastructure and integrating into global mining value chains. During 2023–2024, the industry continued to consolidate, while countries with access to low-cost and renewable energy—particularly Paraguay and Argentina—strengthened their positions. Northern European countries such as Norway, Sweden, and Iceland have also leveraged climate conditions and renewable resources to scale mining operations.

As of 2025, global Bitcoin mining has become significantly more diversified. The United States retains leadership, while Paraguay and El Salvador are playing increasingly prominent roles by utilizing unique

energy sources, including geothermal power. Decentralization continues to strengthen: 28 countries now account for more than 0.1% of the global hash rate, with 9 exceeding 1%. Public companies control 35.2% of total mining capacity—an 11% increase compared to 2022—enhancing transparency, governance standards, and institutional reliability across the sector.

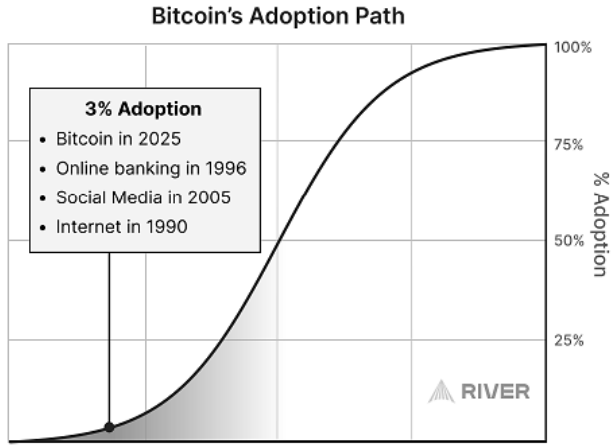
Source: Mining Distribution by Country | **RIVER**

The strategic shift of mining operations toward renewable energy sources highlights the industry's growing focus on sustainability, resilience, and network decentralization. The use of solar, wind, hydro, and geothermal energy reduces the carbon footprint while ensuring greater operational stability. This transition supports a more balanced geographic distribution of hash rate, mitigating concentration risk and strengthening overall network security.

Taken together, these developments reinforce Bitcoin's position as a strategic infrastructure asset, shaping a 21st-century global financial architecture built on transparency, accessibility, and trustless reliability.

Current Level of Adoption

As of 2025, Bitcoin remains in the early stage of global adoption—only about 3% of the world's population holds it. While this figure may seem modest, it mirrors the phase at which other foundational technologies began their exponential growth. The internet reached a comparable level around 1990, online banking around 1996, and social media around 2005. These examples illustrate that 3% is not a ceiling—it is the starting point of the exponential adoption curve typical of breakthrough innovations. According to the S-curve of adoption, this is precisely the stage where technologies transition into mass adoption.

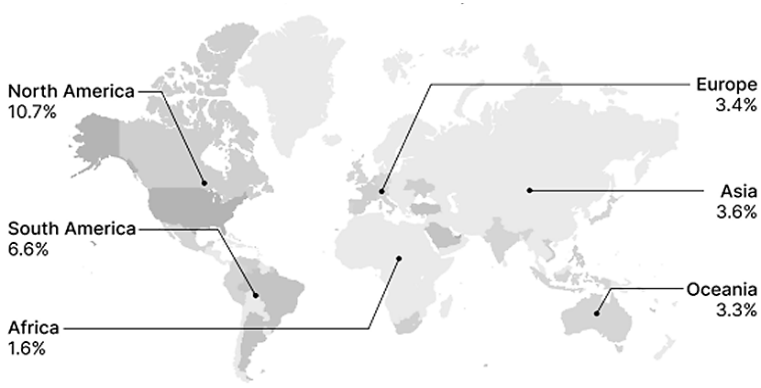


Source: Bitcoin Adoption Status in 2025 | **RIVER**

Bitcoin today reflects a similar trajectory. Individual users, corporations, and even sovereign entities increasingly view it not only as a store of value but also as a functional instrument for payments, remittances, and investment. In parallel, the supporting infrastructure continues to evolve—mobile wallets, exchanges, institutional funds, and payment rails are making access and everyday usability significantly easier.

The current phase of adoption naturally extends into the geography of Bitcoin ownership. While global penetration remains limited, the distribution of the asset across countries and regions is steadily expanding. The United States, Canada, Europe, and parts of Asia demonstrate

relatively high adoption among both retail and institutional participants, while emerging regions—particularly Latin America and Africa—are gradually increasing their activity. This geographic diversification fosters a more decentralized user base, reduces concentration risk, and lays the groundwork for scalable global adoption, enhancing Bitcoin's accessibility in everyday financial use.



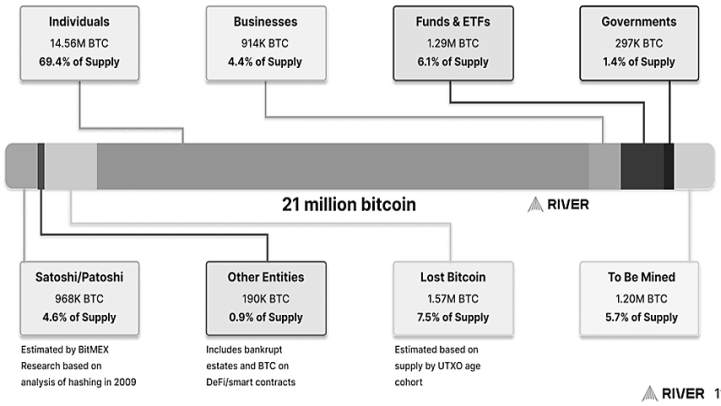
Source: Bitcoin Ownership Share by Continent | RIVER

Despite the rapid growth in global interest, actual adoption among individuals remains relatively low. The highest ownership rates are observed in North America: in the United States, approximately 14% of the population has exposure to Bitcoin. In South America, the figure stands at 6.6%, in Asia, 3.6%, in Europe, 3.4%, in Oceania, 3.3% and in Africa, just 1.6%.

Lower penetration in certain regions is often driven by limited awareness of Bitcoin's capabilities, restricted access to reliable infrastructure, and underdeveloped local markets. The global expansion of Bitcoin's user base makes the structure of its ownership increasingly important, offering insight into the roles of individuals, corporations, and governments in shaping the emerging financial architecture.

Bitcoin's growing recognition as a new asset class—one that challenges traditional financial models—makes the question of ownership central. As of the first half of 2025, the distribution of Bitcoin reflects a unique

structure that differs significantly from the centralized nature of legacy financial markets.



Source: Bitcoin Ownership Structure by Participant | **RIVER**

Bitcoin continues to attract a broad spectrum of participants—from individual users and tech enthusiasts to corporations, governments, and global investment funds. The total supply is capped at 21 million coins, of which:

1. **14.56 million BTC (69.4%)**—held by private individuals, ranging from early tech adopters to investors in countries with unstable currencies or limited access to traditional financial infrastructure.
2. **1.29 million BTC (6.1%)**—allocated to ETFs and funds, which have simplified access to Bitcoin for pension funds, hedge funds, and traditional capital. This channel has become a key driver of Bitcoin's legitimization within conventional financial markets.
3. **914,000 BTC (4.4%)**—controlled by corporations integrating Bitcoin into their balance sheets, payment models, and financial strategies. This segment reflects the shift from experimental usage to strategic corporate adoption.

4. **297,000 BTC (1.4%)**—held by governments, primarily through confiscations but increasingly as part of strategic interest in digital reserves. While still relatively small, this share signals Bitcoin's gradual entry into sovereign economic policy.

A distinct portion of Bitcoin either remains inactive or is effectively removed from circulation:

5. **968,000 BTC (4.6%)**—coins that have never moved since being mined, forming a kind of "untouchable reserve," often associated with Satoshi Nakamoto.
6. **1.57 million BTC (7.5%)**—considered permanently lost due to lost private keys, deceased holders, or early-stage infrastructure errors. This effectively reduces Bitcoin's real circulating supply.
7. **1.29 million BTC (5.7%)**—coins yet to be issued, which will enter circulation gradually according to the protocol-defined emission schedule, influencing long-term market liquidity.

The ownership structure of Bitcoin underscores its uniqueness as a financial asset—one that simultaneously spans governments, corporations, and millions of individual participants. Despite growing institutional interest, individual holders remain the dominant force, preserving the network's decentralized nature. Businesses are increasingly integrating Bitcoin into their financial models, while governments—albeit cautiously—are beginning to explore its role within economic strategy.

This distribution creates a resilient and adaptive ecosystem, capable of responding to the challenges of the global market while reinforcing Bitcoin's position as a foundational layer of the emerging digital financial system.

Pathways to Global Adoption

As of 2025, the United States has emerged as a central power hub within the Bitcoin ecosystem, concentrating both financial and technological infrastructure that sets global standards for crypto adoption. Approximately 40% of the world's total Bitcoin supply is held by American corporations, institutions, and private individuals—equivalent to more than $790 billion in nominal value. U.S. government entities control around 198,000 BTC, acquired through seizures or custodial holdings, and nearly 95% of the Bitcoin owned by publicly traded companies worldwide.

U.S. institutional dominance is reinforced by its financial infrastructure. American spot and derivatives Bitcoin ETFs account for over 79% of global assets in this segment—approximately $42.6 billion. Venture capital funding from the United States represents roughly 70% of total global investment in the crypto sector. The country also controls about 36% of the global hash rate and operates more than 40 large-scale mining facilities, each exceeding 10 MW in capacity. Over 150 specialized Bitcoin companies operate within the U.S., employing more than 20,000 professionals. Strategic exposure is further strengthened by major players such as Citadel, Millennium Management, and MassMutual, as well as university and pension funds from Harvard University and Yale University, which invest directly or indirectly in Bitcoin infrastructure.

Taken together, these factors position the United States not only as a market leader but also as a source of regulatory and institutional benchmarks for other countries.

The continued global expansion of Bitcoin is shaped by several interrelated factors, with regulatory policy playing a pivotal role. Prior to 2020, legal uncertainty constrained mass adoption however, the landscape has shifted significantly in recent years.

As of 2025, 47 countries have expanded legal access to Bitcoin, enabling both investment and economic use. At the same time, only nine countries maintain a full ban, while most jurisdictions that previously imposed restrictions have revised their positions after 2022. These regulatory shifts are transforming national financial systems. In countries such as Argentina,

Turkey, Bolivia, and Morocco, Bitcoin is being integrated into payment ecosystems as a tool for financial inclusion and inflation hedging. Financial hubs like Hong Kong and Nigeria are establishing legal frameworks for both retail and institutional access. In the United States, banks are permitted to custody Bitcoin, while legislative initiatives are being considered to incorporate BTC into broader financial strategy.

Direct state participation in the Bitcoin ecosystem is also increasing. El Salvador continues to accumulate Bitcoin, holding over 6,000 BTC. Other countries—including Bhutan, Iran, and Argentina—are developing state or semi-state mining operations. Significant Bitcoin reserves are also held by governments through confiscations in criminal proceedings in the United States, United Kingdom, China, and Finland. Meanwhile, the United Arab Emirates, Norway, and Switzerland demonstrate strategic interest through sovereign wealth funds.

Another critical vector of adoption is institutional financial products, particularly pension funds. The launch of spot Bitcoin ETFs in the United States has unlocked access for large-scale institutional capital. The potential inclusion of BTC in long-term pension allocation strategies could provide millions of individuals with indirect exposure through traditional financial instruments, reinforcing its status as a legitimate asset class.

A key technological catalyst for mass adoption remains the Lightning Network, which enables instant, near-zero-cost micropayments. This addresses the scalability limitations of Bitcoin's base layer and makes it viable for everyday transactions—especially in regions with high mobile payment usage and limited access to traditional banking infrastructure.

The final factor is awareness. Despite growing trust, only about 3% of the global population currently owns Bitcoin—indicating not a limitation but substantial untapped potential. Continued adoption will require systematic education, positioning Bitcoin as a tool for value preservation, inflation hedging, and financial sovereignty, while gradually overcoming barriers of misunderstanding and distrust.

The global expansion of Bitcoin in 2025 signals its transition from an experimental innovation to a systemic component of the global financial

architecture. The leadership of the United States—anchored in institutional investment, mining capacity, and regulatory influence—continues to shape global standards for digital asset adoption. At the same time, growing participation from governments, financial hubs, and sovereign funds points to Bitcoin's gradual integration into both national and supranational economic strategies.

At the same time, actual ownership among the global population remains relatively low, underscoring significant growth potential. The development of payment infrastructure powered by the Lightning Network, combined with rising financial literacy and improved technological accessibility, is paving the way for a transition from investment use cases to everyday transactional utility.

Collectively, these dynamics signal the emergence of a decentralized, resilient, and globally integrated ecosystem—one in which Bitcoin is steadily solidifying its role as a foundational layer of the 21st-century economy.

Part III: The Framework of a New Financial System

On July 14, 2025, the global financial system effectively entered a new phase of development. The traditional model of international money transfers—long reliant on banks and legacy networks—is gradually giving way to a new digital financial infrastructure that is faster, more accessible, and technologically advanced.

This section explains what this system is, how it operates, why it became necessary, and who is driving its implementation. All key concepts are presented in a clear, accessible, and practical way—making complex financial transformation easy to understand while preserving its strategic depth.

Inefficiency of the Traditional Financial System

The traditional financial infrastructure has a number of systemic inefficiencies. International transfers can take anywhere from two to five days, involve significant banking fees, and rely on a long chain of intermediaries. In many countries with underdeveloped banking systems, a large portion of the population has no access to basic financial services at all. Another major challenge is integration complexity: different banks and jurisdictions use incompatible formats and legacy technologies, which slows down data processing and increases the risk of errors.

A new digital financial system removes these limitations. Transfers can be executed in seconds, costs are reduced through the elimination of unnecessary intermediaries, and participation in financial activity becomes possible even without a traditional bank account.

The Architecture of the New Financial System

Imagine sending money to someone in another country. In the traditional financial system, such a payment can take several days, incur high fees, and require multiple layers of verification. The international settlement infrastructure—centered around banks and networks such as SWIFT—was built decades ago and no longer matches the pace of today's global

economy. It is slow, expensive, and often inaccessible to millions of people, especially in emerging markets.

The new digital financial system offers an alternative. It combines modern technologies such as blockchain, universal financial messaging standards like ISO 20022, and inter-network protocols such as the Interledger Protocol (ILP). Its goal is to make financial operations faster, cheaper, more transparent, and accessible to a significantly broader range of users.

Components of the New Financial System

- **ISO 20022**

ISO 20022 is a unified global standard for financial messaging exchange. In the past, each country or institution used its own proprietary formats, which made system interoperability difficult and required extensive manual data processing. ISO 20022 introduces a structured, machine-readable messaging format that enables banks, financial institutions, and even crypto platforms to "speak the same language."

In 2025, key components of the global financial infrastructure transitioned to this standard: in July, the U.S. Fedwire system adopted ISO 20022, and in November, the SWIFT network completed its migration. Overall, ISO 20022 already covers approximately 80% of all global financial transactions, including those across the EU, China, India, Japan, the United Kingdom, Singapore, and Hong Kong.

- **Interledger Protocol**

The Interledger Protocol is a technology designed to enable interoperability between different financial systems. Just as the internet connects separate websites into a unified network, ILP creates a shared financial layer where value can move seamlessly between banks, blockchain networks, and payment applications.

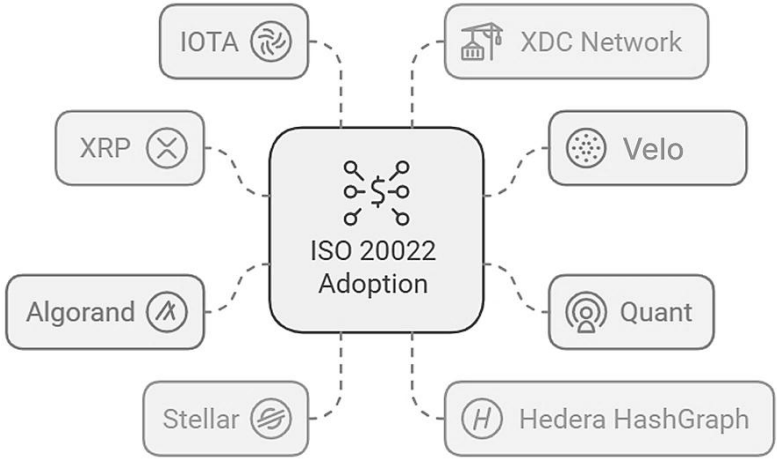
ILP functions as a universal bridge across financial ecosystems. For example, it can enable fast and secure transfers from a U.S. bank account to a crypto platform in Pakistan with minimal fees and friction. A practical

implementation of this technology is Rafiki Remit, a platform that uses ILP to facilitate cross-border payments—an especially critical function for a country that receives approximately $9 billion in annual remittance inflows from abroad.

More broadly, the Interledger Protocol plays a key role in expanding global financial accessibility, making transactions faster, cheaper, and more inclusive, particularly in regions with limited banking infrastructure.

Tools of the New Financial System

The transition to a new digital financial system is impossible without tools capable of operating under its rules. This is not about abstract cryptocurrencies or speculative tokens but about blockchain networks and digital assets that are already being adapted to the requirements of global financial infrastructure. A key condition for such integration is compatibility with the ISO 20022 standard—the universal language of financial messaging being adopted by central banks, SWIFT, and national payment systems.



Source: Crypto Projects with ISO 20022 Integration | **GATE**

Unlike the early stage of the crypto market, where most projects operated in isolation from traditional finance, the new generation of digital assets is being designed with regulatory compliance, institutional interoperability,

and real economic use cases in mind. These assets serve concrete functions: enabling cross-border payments, supporting central bank digital currencies (CBDCs), financing international trade, tokenizing real-world assets, and facilitating data exchange between financial systems.

Together, these projects form the "financial rails" of the future — an infrastructure layer connecting banks, governments, corporations, and digital economies into a unified, interoperable system. Below are key digital assets and blockchain platforms that are already positioned to operate within this new financial architecture and play a strategic role in its development.

Ripple (XRP) for cross-border payments. Ripple is a cryptocurrency designed to enable fast and efficient international money transfers. Its primary role is to help banks and financial institutions move large sums across borders quickly, reducing both transaction costs and settlement time. The RippleNet network, which utilizes XRP, is already used in Thailand, the UAE, India, Japan, Singapore, and several European countries. It provides reliable, fast, and low-cost cross-border payment infrastructure for financial institutions.

In May 2020, Ripple became the first distributed ledger technology (DLT) company to join the ISO 20022 standards body. As a result, RippleNet is fully aligned with systems such as SWIFT and central banks, opening the door for broader global adoption.

Velo for cross-border payments in Asia. Ripple Velo is a foundational layer of the new financial "rails" connecting traditional monetary systems with digital assets. Its core feature is acting as a bridge between fiat currencies (USD, EUR, JPY, HKD) and blockchain infrastructure. The protocol already facilitates cross-border payments across Southeast Asia and is integrated with major players such as Stripe, Lightnet, Paxos, and SCB, creating infrastructure for instant, low-cost, and regulation-compliant transactions.

VELO is also becoming a key node in CBDC development across Thailand, Laos, Cambodia, and Vietnam, working alongside Ripple, Stellar

the Asian Development Bank. This enables national digital currencies to be integrated into a unified regional payment ecosystem.

Stellar (XLM) for financial inclusion. Stellar is a project built around financial equality, designed to provide access to financial services for unbanked populations, particularly in vulnerable regions. It focuses on practical use cases such as remittances, wallets, micropayments, and humanitarian aid.

As of 2025, Stellar is already widely used in practice. In partnership with the UN and UNHCR, it is used for digital humanitarian assistance, and Ukrainians in conflict zones receive funds via USDC on the Stellar network instantly—directly to wallets or Visa cards. Since 2021, Stellar has also supported a pilot digital hryvnia (CBDC) project in cooperation with Ukraine's Ministry of Digital Transformation. Major partners such as IBM, MoneyGram, Société Générale, and PayPal are integrating services built on Stellar.

XinFin (XDC) for international trade infrastructure. XinFin is a hybrid blockchain network (public + private) designed for trade finance and business infrastructure, enabling secure processing of financial documents such as invoices, contracts, and payments.

The XDC network is ISO 20022 compliant, allowing it to interoperate with banks, payment systems, and SWIFT. This enables companies to conduct international transactions faster, cheaper, and with fewer intermediaries, especially in document-heavy industries such as trade, logistics, and supply chain finance.

XDC is also used in real-world asset (RWA) tokenization, including initiatives with JPMorgan and Enigio for paperless trade. The Archax exchange uses XDC to bring traditional financial instruments on-chain, demonstrating institutional trust and adoption.

Algorand (ALGO) as CBDC infrastructure. Stellar Algorand is a high-performance blockchain platform designed for scalable, secure, and decentralized financial and non-financial applications, including government initiatives, asset tokenization, and digital identity. Its energy efficiency (carbon-negative status), government partnerships, and

technical stability positions it as a strong candidate for global digital financial infrastructure.

The platform is actively used in central bank pilot projects across Latin America, Europe, and Africa. It is also applied in digital identity systems, government bonds, and energy tokenization. For example, Enel Group tokenizes solar energy, while World Chess uses it for digital player identities.

Hedera (HBAR) for corporate and institutional settlement. Hedera is a high-performance alternative to traditional blockchain systems, designed for corporations, financial institutions, and governments. It uses a unique consensus mechanism—the hashgraph—delivering high speed, scalability, and security.

HBAR is ISO 20022 compatible, enabling seamless integration with banks, SWIFT, CBDC platforms, and other financial systems. It is used for digital identity, micropayments, asset tokenization, and carbon credit systems. Real-world implementations include Avery Dennison in supply chains, DOVU in sustainability initiatives, and pilot government healthcare projects in the UAE and India.

IOTA for data autonomy infrastructure. IOTA is an innovative platform built for a future where devices exchange data and value autonomously. It is designed for the Internet of Things (IoT) and machine-to-machine (M2M) transactions. For example, autonomous vehicles can pay for charging or parking without human involvement.

IOTA operates on the Tangle architecture, enabling high-throughput, feeless transactions—ideal for smart cities, industrial systems, and logistics. The platform is partially aligned with ISO 20022 and integrates through institutional alliances such as TLIP (supported by the World Economic Forum and the TWIN Foundation).

Quant (QNT) as a universal interoperability bridge. Quant does not build its own blockchain instead, it enables interoperability across multiple networks. Its Overledger technology acts as a bridge between blockchains, government financial systems, and enterprise platforms, allowing banks, governments, and corporations to use multiple systems simultaneously.

Quant is involved in major initiatives such as the European Central Bank's digital euro project and the modernization of the Bank of England's RTGS payment system. It also collaborates with Oracle and the UK Regulated Liability Network to support 24/7 financial transaction infrastructure.

ONDO for public access to real-world assets (RWA). ONDO is a key project in real-world asset tokenization, bringing government bonds, corporate securities, and other financial instruments onto public blockchains. It enables the convergence of traditional finance (TradFi) and decentralized finance (DeFi), while setting institutional standards for blockchain adoption.

The project collaborates with BlackRock (via OUSG), JPMorgan (through early tokenized bond transactions on Ondo Chain), and Chainlink (via CCIP). ONDO acts as a bridge between regulated financial markets and Web3 infrastructure and already operates with multibillion-dollar capital flows, shaping the pace of the tokenized financial system's evolution.

Organization of the New Financial System

Imagine the new financial system as a modern digital city, where the movement of value is organized just like transportation in a highly developed metropolis. There is no chaos or manual coordination—each component has its own role, and together they form a unified, uninterrupted mechanism for global financial flows.

Within this architecture, ISO 20022 acts as the universal traffic rules. It is a shared financial language understood equally by banks, payment systems, and blockchain networks. It eliminates fragmentation between different infrastructures, enabling them to exchange data and value without loss, delays, or manual reconciliation. The transition of SWIFT and Fedwire to ISO 20022 in 2025 effectively solidifies this standard as the foundation of the new financial architecture.

Interledger Protocol (ILP) functions as the high-speed highway network in this model. It does not replace existing systems but connects them, enabling direct value transfer between banks, payment platforms, and

digital asset networks. These protocols remove barriers between national, corporate, and technological financial ecosystems.

Digital assets in this model represent different types of transportation, each optimized for specific functions:

1. **XRP and VELO** serve as high-speed corridors, enabling rapid cross-system capital movement.
2. **XDC** resembles a trade port, where documents, contracts, and financial obligations exist in tokenized form and seamlessly interact with corporate and cross-border processes.
3. **HBAR and ALGO** form the administrative and governmental districts of the ecosystem, acting as foundational platforms for CBDC deployment, government registries, and enterprise-grade settlement systems, where scalability, governance predictability, and regulatory compliance are essential.
4. **ONDO** concentrates financial liquidity and tokenized instruments, bridging traditional capital markets with blockchain infrastructure and connecting legacy finance with digital assets.
5. **XLM** functions as urban logistics, enabling simple and accessible payments for everyday use, micropayments, and humanitarian programs where low fees and broad accessibility are critical.
6. **QNT** operates as the operating system of this architecture, synchronizing different networks and protocols and ensuring interoperability at the infrastructure level.
7. **IOTA та DAG** form the data layer, acting as autonomous, secure, and scalable communication channels for machines, government systems, and critical infrastructure—where blockchain extends beyond finance and becomes a foundation for the Internet of Things and digital public services.

CBDCs in this system function as the official currency of the city—issued by governments but fully adapted to digital logic. They are programmable,

instant, and compatible with global standards, integrating into the shared infrastructure through blockchain platforms and financial protocols.

Tokenization completes this architecture by converting assets—from money and bonds to contracts and physical goods—into digital form that can be easily transferred, fractioned, and embedded into automated processes. At the same time, the list and nature of these assets are not static: as economies and technologies evolve, new forms emerge while others transform or become obsolete. Therefore, the key capability is not reliance on a fixed set of solutions but the ability to track these shifts and understand which projects achieve systemic integration and define the next stage of development.

As a result, what emerges is not an upgraded version of the old financial model but a fundamentally new reality. It is built not around individual institutions or jurisdictions but around standards, protocols, and interoperability. Money, data, and assets move in real time, fees are reduced to a minimum, and global access to economic activity becomes the norm.

This transformation already extends beyond finance. The new infrastructure is gradually integrating into trade, logistics, energy systems, identity management, and public services. This is how a next-generation digital economy is being formed—not as an overlay on the old system but as a new architecture where trust, automation, and interoperability are embedded at the foundational level.

Part IV: The Digital Economy

We are entering a stage of development where digital technologies are no longer producing isolated tools but entire economic environments. In this new reality, the key factor is not the speed of adopting individual solutions but the ability to systematically restructure processes according to digital logic. This is why countries, corporations, and industries that integrate blockchain infrastructure earlier than others are establishing a long-term strategic advantage.

The blockchain economy is not an isolated domain or a niche innovation. It is gradually becoming a foundational coordination and accounting layer upon which financial, trade, production, and governance processes are built. A significant portion of these transformations occurs outside the public spotlight—within corporate internal systems, inter-institutional settlements, supply chains, and government platforms. It is precisely in these areas that blockchain delivers its greatest impact: reducing manual operations, eliminating unnecessary intermediaries, and increasing transparency.

Large corporations, financial groups, and government institutions are the first to leverage these capabilities. For them, blockchain is not an experiment but an infrastructure solution that enhances the manageability of complex systems, ensures data integrity, and automates interaction between participants. As these solutions scale, a new operational standard is emerging—one that is gradually spreading across the entire market.

Today, blockchain and digital assets are already integrated into finance, logistics, retail, healthcare, government services, real estate, energy, media, insurance, transportation, agriculture, manufacturing, and IT. Each of these sectors applies the technology differently—depending on its specific needs, regulatory environment, and scale of operations. This is why the blockchain economy cannot be understood in abstract terms it becomes visible only through concrete use cases.

In the following sections, we will examine each key segment of the economy separately and show how blockchain is already functioning

within real-world processes, which problems it solves, which operational models it transforms, and why these solutions are being implemented not in the future—but today.

Banking and Financial Services

The financial sector is among the first and most active adopters of blockchain technologies as an infrastructure solution. For banks, this is not an experiment but a way to modernize core processes. Distributed ledgers enable cost reduction, faster settlement, and improved data integrity. Multiple participants can operate from a single source of truth without duplicating information or relying on numerous intermediaries, which reduces operational risk and minimizes errors.

The most visible transformation is taking place in cross-border payments and interbank settlements. For example, Axis Bank and J.P. Morgan, through the Kinexys platform, have implemented 24/7 USD settlement for Indian corporates. This removes the time constraints of traditional banking and significantly reduces the need for pre-funded liquidity. Similar approaches are being adopted in other jurisdictions, where blockchain is used as an automation layer on top of existing financial infrastructure.

In trade finance, blockchain addresses one of the industry's biggest inefficiencies: paper-heavy processes and delays. Smart contracts automate trade execution, payments, and document verification. Platforms such as We.Trade (involving HSBC and Société Générale) and Komgo (supported by ING) significantly reduce processing times and lower fraud risk. At the same time, financial instrument tokenization is expanding. UBS and BBVA have already launched tokenized funds on public and semi-private blockchain platforms, making investment products more accessible and cheaper to administer.

Large banks are moving from pilots to large-scale deployment. Within Kinexys, J.P. Morgan processes over $2 billion in interbank payments daily, including FX settlement. The Fnality initiative, involving Santander, HSBC, and UBS, is developing the concept of central bank-backed settlement

tokens for instant inter-institutional transactions. Canton Network, which includes Deutsche Börse, Goldman Sachs, and Euroclear, is building a model for exchanging confidential financial transactions while combining privacy requirements with blockchain-based infrastructure logic.

Blockchain also significantly improves regulatory processes. In KYC and AML frameworks, banks use distributed ledgers to securely store and verify customer data. For instance, PKO Bank Polski uses blockchain for encrypted data storage, simplifying audits and reducing compliance costs. Central banks are also actively testing DLT solutions. Projects such as Project Jasper in Canada and mBridge—jointly developed by Hong Kong, the UAE, Thailand, China, Saudi Arabia, and the Bank for International Settlements—demonstrate how blockchain can serve as the foundation for cross-border settlements and central bank digital currencies.

Overall, the banking sector is gradually shifting from experimentation to structural transformation. In this context, blockchain is not an alternative to the financial system but a new operational layer that enhances the speed, transparency, and resilience of global financial processes.

Logistics and Supply Chains

Logistics was one of the first non-financial sectors where blockchain demonstrated practical, large-scale industrial value. The industry's core challenges include fragmented data, low transparency, and coordination complexity across dozens of participants. Blockchain addresses this by providing a shared, immutable ledger where all parties operate on a single source of truth.

As a result, manufacturers, logistics operators, regulators, and end consumers can verify product origin, shipment routes, storage conditions, and authenticity in real time. This is particularly critical in sectors where errors are costly—such as food production, pharmaceuticals, medical devices, and luxury goods.

Major corporations are no longer experimenting but systematically deploying blockchain infrastructure. Walmart, for example, uses

Hyperledger Fabric—a permissioned enterprise blockchain developed under the Linux Foundation. It enables private networks where data is protected yet verifiable by authorized participants. On this foundation, Walmart built a food traceability system "from farm to shelf," reducing source identification time from days or weeks to seconds.

In the pharmaceutical industry, a key example is MediLedger—a blockchain network built on Quorum, an enterprise-grade version of Ethereum with enhanced privacy. MediLedger connects manufacturers, distributors, and pharmacies into a unified system for drug verification, helping comply with regulatory frameworks such as the U.S. DSCSA and effectively combating counterfeit medicines.

In global shipping, blockchain is used to digitize documentation workflows. One of the world's largest shipping companies, Maersk, in collaboration with IBM, developed the TradeLens platform based on Hyperledger Fabric. It automates document exchange between ports, customs authorities, and logistics providers, significantly reducing costs and shipment processing delays.

Alongside enterprise solutions, public blockchain networks are also expanding in supply chain transparency. VeChain specializes in product authenticity and traceability and is widely used in China and Southeast Asia. Companies such as Walmart China, BMW, LVMH, and Haier leverage VeChain to combat counterfeiting and track product lifecycles in real time.

In summary, logistics demonstrates how blockchain is becoming an infrastructural layer for global trade. Private networks such as Hyperledger and Quorum are used where access control and regulatory compliance are critical. Public blockchains such as VeChain and OriginTrail enable scalability and transparent interaction with end users. Together, they form a new supply chain model—digital, verifiable, and resistant to manipulation.

Retail and E-Commerce

Blockchain in retail and e-commerce is gradually transforming traditional business processes, making them more transparent, secure, and efficient.

One of the most widespread use cases is the implementation of token-based loyalty programs. Instead of closed, centralized reward points, companies use digital tokens that customers receive for purchases and can redeem for discounts, gifts, or additional services. All transactions are recorded on the blockchain, which simplifies accounting and eliminates the possibility of manipulation. For example, Shopify-based online stores, through third-party integrations, use Solana to launch such reward programs.

Another key area is payments. The use of cryptocurrencies and stablecoins reduces transaction costs and accelerates settlement, especially in cross-border commerce. Platforms increasingly accept Bitcoin, USDT, or USDC as alternatives to traditional payment systems. A notable example is the U.S. retailer Overstock, which has accepted Bitcoin since 2014, demonstrating long-term integration of digital currencies into retail.

Blockchain also enhances supply chain transparency. Immutable ledger records allow tracking a product's journey from manufacturer to consumer. Companies such as Nestlé and Carrefour use IBM Food Trust based on Hyperledger Fabric, where consumers can scan a QR code to see where and when a product was produced, packaged, and delivered. This increases trust and simplifies quality control.

In the premium goods segment, blockchain helps combat counterfeiting. The VeChain platform is used to track luxury items such as alcohol, watches, and fashion goods. IoT-generated data is recorded on a decentralized ledger, allowing buyers to verify authenticity in real time.

New forms of customer engagement are also emerging through digital assets. Brands such as Nike and Adidas use NFTs to issue unique digital goods and build additional engagement channels. Through platforms like OpenSea, they connect physical products with digital experiences, creating a new model of loyalty and customer interaction.

Healthcare

The healthcare sector is rapidly transitioning into a digital format, and distributed technologies are becoming a key foundation of this transformation. The COVID-19 pandemic clearly exposed the vulnerabilities of traditional medical data systems, increasing demand for secure, transparent, and decentralized solutions. Regulatory frameworks such as GDPR in Europe and HIPAA in the United States further reinforce the need for strict control over the storage, transfer, and processing of personal health information. In this context, blockchain offers practical advantages.

One of the key applications is the protection of personal medical records. Instead of centralized databases—prime targets for cyberattacks—data is stored in a distributed and encrypted form. Access is controlled by the patient, often through smart contracts. An example is Patientory within the Ethereum ecosystem, where medical records are accessible only to authorized doctors or institutions with the patient's consent.

Equally important is the transparency of pharmaceutical supply chains. Counterfeit medication remains a global threat, and distributed ledgers allow every package to be tracked from manufacturer to pharmacy. The MediLedger platform, built on Quorum, records every stage of a drug's lifecycle in an immutable ledger and is already used by pharmaceutical companies such as Pfizer and Gilead.

Blockchain also simplifies the exchange of medical data between institutions. Patients often visit multiple hospitals and specialists who do not have access to a complete medical history. Decentralized systems create a single source of truth, accessible only with patient authorization. An example is BurstIQ, which enables secure exchange of large-scale health data between hospitals, insurance providers, and research organizations.
Another important area is care coordination and cost optimization. Solutions such as SolveCare, built on EOS, helps schedule medical appointments, coordinate treatment, and optimize patient costs. In the enterprise segment, similar functions are performed by systems based on

Hyperledger Fabric, such as the IBM Health Utility Network, which enables secure data exchange across large healthcare ecosystems.

Today, distributed technologies in healthcare have already moved beyond experimentation. They enhance security, reduce fraud, simplify data exchange, and make treatment more personalized and efficient. In the long term, this model leads to a system where the patient becomes the true owner of their medical data and an active participant in their own healthcare journey.

Government Services

The public sector is one of the most promising areas for the adoption of distributed technologies, as trust, transparency, and efficiency are critical here. From digital citizen identity to elections and social welfare payments, blockchain is gradually becoming the foundation for new approaches to delivering public services.

One of the key use cases is digital identity. In a number of countries, citizens are issued secure digital IDs that cannot be forged or altered. One of the most well-known examples is Estonia, where KSI technology is used to secure e-government services. This enables the integration of digital signatures, tax records, property registries, and other services into a unified system while keeping control over personal data in the hands of the citizen.

Another important area is electronic voting. Distributed ledgers ensure election transparency, result immutability, and voter anonymity. Pilot projects using Hyperledger Fabric, Ethereum, or specialized platforms such as Voatz have been tested in Switzerland, South Korea, and several U.S. states. This approach reduces the risk of fraud and increases trust in the electoral process.

Blockchain also plays a significant role in social welfare and humanitarian aid. After 2022, international organizations began using digital wallets and stablecoins for direct payments to affected individuals without intermediary banks. In Ukraine, part of the aid provided to refugees in Kyiv and Lviv was distributed in USDT or DAI on the Ethereum

network through platforms such as Giveth and zkSync. This reduced costs, accelerated disbursement, and lowered corruption risks.

In summary, distributed technologies in public administration do not merely automate existing processes—they fundamentally reshape the relationship between citizens and the state. They reduce bureaucracy, increase transparency, and establish a new level of civic trust.

Real Estate Sector

Distributed ledger technologies are gradually reshaping the rules of the real estate market by simplifying transactions, improving security, and opening investment opportunities to a broader audience. One of the key innovations is tokenization, which allows a real estate asset to be divided into digital shares (tokens) that can be purchased online.

This makes real estate investment accessible even to individuals without significant initial capital. Investors can receive a share of rental income and sell their portion when needed. Platforms such as RealT, REINNO, and Harbor already offer such models in the United States and Europe.

Digital registries also simplify property transactions. Through smart contracts, many processes—data verification, payments, and ownership transfers—are executed automatically and without intermediaries. This reduces the risk of errors and fraud while significantly accelerating deal execution. For example, Propy enables fully online real estate transactions, allowing users to buy or sell property without physically visiting a location. Another advantage is reliable ownership recording. Immutable digital registries reduce the risk of document forgery and legal disputes, which is especially important in countries with less developed public record systems.

The decentralized model also supports international investment. Individuals from anywhere in the world can purchase fractional ownership of real estate using cryptocurrency, without complex bureaucracy, currency restrictions, or excessive fees. As a result, modern technologies

are making the real estate market more accessible, transactions simpler, and asset management more transparent and secure.

Energy Sector

The energy sector is increasingly shifting toward decentralized models, and distributed ledger technologies play a key role in this transformation. The growth of renewable energy, microgrids, and "smart" consumption requires transparent accounting, flexible settlement systems, and direct electricity trading between market participants.

With blockchain, households equipped with solar panels or wind turbines can directly sell surplus electricity to other consumers. All transactions are recorded via smart contracts, which automatically calculate consumption volumes, pricing, and payment distribution without intermediaries. This reduces pressure on centralized grids, improves efficiency, and creates a more equitable energy market.

In practice, these models are already operational. The Australian project Power Ledger enables peer-to-peer electricity trading in local microgrids across the United States, Japan, and Europe. WePower tokenizes future energy production, simplifying financing for renewable generation. Large corporations such as Enel Group are testing blockchain for tracking and auditing renewable energy flows. In the United Kingdom, the Electron platform helps manage smart meter data, while in the United States, the Brooklyn Microgrid project allows residents to buy and sell solar energy within their local community.

Overall, distributed technologies are transforming consumers into active participants in the energy market. For individuals, this means new income streams and greater control over consumption. For governments, it enables transparent subsidies, accurate metering, and the foundation for smart cities and resilient energy systems.

Media and Entertainment

The media, gaming, and entertainment industries are undergoing a profound transformation thanks to distributed ledgers and digital assets.

Content creators have, for the first time in a long while, gained tools for direct monetization of their work, bypassing traditional intermediaries such as music labels, publishers, and streaming platforms.

Key technologies driving this shift include NFTs, smart contracts, and tokenized in-game economies. These tools enable ownership rights over digital content—music, videos, images, or in-game characters—to be securely recorded and verified. Tokens can be bought, sold, traded, or used as access keys to exclusive content. Smart contracts automatically distribute royalties on every resale, creating continuous revenue streams and greater transparency for creators and fans alike.

A notable example is the anticipated release of Grand Theft Auto VI by Rockstar. According to reports, the game may introduce in-game transactions powered by digital assets. If confirmed, GTA VI would become the first AAA title of this scale to integrate crypto-based financial mechanics, potentially setting a new industry standard.

Traditional business models, which are centered around large corporations and content aggregators, are gradually being replaced by a creator-centric economy. Artists gain full control over their intellectual property, build direct relationships with audiences, and unlock new monetization models where users can even become partial stakeholders in digital content.

Agriculture Sector

Modern agriculture is increasingly adopting distributed ledger technologies to improve transparency, quality control, and product traceability. The choice of platform depends on requirements such as scalability, security, and integration across the entire supply chain—from farmers to end consumers.

ForesTrust uses public Ethereum to track timber and raw materials sourced from forests. The open blockchain ensures data immutability, which is critical for combating illegal logging and improving environmental accountability.

TE-FOOD specializes in transparent tracking of agricultural goods and meat products, helping prevent counterfeiting and increasing consumer trust.

The Australian platform AgriDigital automates financial transactions and logistics in the agricultural sector, making deals between farmers, traders, and buyers more efficient and transparent.

Overall, the agricultural sector integrates a variety of digital solutions, selecting tools based on specific needs: permissioned systems for corporate data control or open supply chain networks for maximum transparency and trust.

Insurance Sector

The insurance industry is actively transforming through the adoption of distributed ledger technologies, which enable claims automation, greater transparency, and more efficient risk management. The choice of specific platforms depends on companies' requirements for security, data processing speed, and confidentiality.

One of the most well-known next-generation insurance companies, Lemonade, uses Ethereum and smart contracts to automate claims assessment and payouts. The integration of artificial intelligence enables fast, transparent, and fair claims resolution, minimizing intermediaries and reducing payout times to a matter of minutes.

Etherisc operates on public Ethereum and offers a decentralized platform for insurance products with automated payouts—for example, in cases of flight delays or crop failure. Smart contracts are triggered once predefined conditions are verified by external oracles, eliminating bureaucracy and delays.

Other players, such as B3i (Blockchain Insurance Industry Initiative), use private enterprise networks like Hyperledger Fabric to build shared insurance ecosystems. This allows participants to securely exchange data, automate payouts, reduce operational costs, and minimize fraud risk.

Overall, the insurance industry combines public platforms and private networks to improve transparency, accelerate payouts, and combat fraud,

while adapting blockchain technologies to the specific requirements of insurance operations.

Manufacturing Sector

The manufacturing sector is increasingly integrating distributed ledger technologies to improve efficiency, enable predictive maintenance, and enhance asset management. The choice of platforms depends on requirements such as data security, supply chain transparency, and IoT integration.

Siemens, one of the global industrial leaders, is exploring blockchain technology to optimize production processes, including predictive maintenance and the management of digital twins. The company uses private networks based on Hyperledger Fabric for secure machine-to-machine and system-level data exchange within industrial environments.
IBM Blockchain supports the creation of transparent supply chains and efficient asset management systems. Integration with IoT devices enables real-time monitoring of equipment conditions and predictive maintenance planning, reducing downtime and operational costs.

VeChain combines IoT and RFID technologies to build transparent supply chains, tracking every stage of production—an approach particularly important for high-tech and pharmaceutical industries. Provenance provides end-to-end traceability of raw materials and finished goods, increasing transparency for both consumers and business partners.

The crypto economy has moved beyond being a niche concept and is increasingly integrated into the global economy. While financial services remain the leading sector in adoption—driven by strong investment and direct benefits from faster transactions and digital assets—industries such as retail, healthcare, and logistics are rapidly catching up.

Modern technologies enhance transparency, efficiency, and security, transforming traditional processes and enabling new models for interaction, allocation, and management of assets, goods, raw materials, and finished products. Only time will reveal how resilient and effective this transformation will prove to be in a world defined by rapid change and high uncertainty.

1. Implementation Concept

Systematic adoption of innovation transforms technologies from isolated novelties into foundational tools, reshaping standards and approaches at both national and global levels. These technologies become catalysts for deep structural change across political, economic, and social systems.

2. Global Adoption

Mining once allowed anyone to participate in the creation of cryptocurrencies by distributing computational power across the world, establishing a stable decentralized foundation. The use of digital assets varied depending on economic conditions, regulatory frameworks, technological access, and financial infrastructure across different regions, resulting in diverse local adoption models.

3. Global Integration

The real-world effectiveness of these technologies accelerates their integration into both business and government processes. Governments and large institutional players often act as primary drivers, enabling standardization and large-scale deployment. Distributed ledgers and decentralized platforms are becoming part of the global financial system—including infrastructure such as Fedwire and SWIFT—enhancing transaction speed, transparency, and security.

4. Integration into Everyday Life

These technologies are increasingly visible in finance, logistics, public services, and regulatory systems, delivering transparency, efficiency, and control. They are becoming essential for businesses, governments, and citizens, driving the emergence of new solutions and business models, expanding the space for innovation, and shaping a more transparent, decentralized, and resilient digital economy.

5

CHAPTER

Do Your Own Research

"DYOR" is a call for investors to take responsibility for their own investment decisions and to conduct thorough due diligence on the projects they plan to invest in.

I'm starting this chapter with a story that became a true entry point for me into deeper research on crypto projects and the formation of my own approach to evaluating them. Long before terms like "blockchain", "DeFi", or decentralized protocols entered my vocabulary, it all began with a simple human curiosity about individual assets whose names I first heard in conversations with colleagues. Those informal discussions—without any clear goal or structure—unexpectedly became the foundation of my analytical journey.

We talked about developments in the digital space, the shortage and rising prices of graphics cards, and shared impressions about Bitcoin and its volatility. But there was one name that kept appearing in almost every conversation, again and again. It was the XRP token from Ripple.

One of my colleagues, an early enthusiast of the project, could talk about it for hours with genuine excitement. He explained the network's architecture, its potential in interbank transfers, and how this asset could reshape financial infrastructure. One idea he repeated very clearly: XRP would inevitably reach the one-dollar mark. At the time, this sounded

bold—and at times even almost fantastical. Still, his confidence and the internal logic of his arguments were compelling enough that I felt the need to understand it myself

That was the moment my first intentional research began. I started reading, analyzing, comparing, and diving not only into Ripple but also into other projects as well, gradually realizing that behind every token there is far more than just a price chart. It was a transition from surface-level interest to a systematic approach.

Two years later, in 2017, XRP did in fact reach the one-dollar level—the very milestone my colleague had spoken about with such confidence back in 2015. For me, this became an important internal turning point. I clearly realized that a deep understanding of technology, project logic, and its place within a broader system allows you to anticipate developments. It is not about guessing price movements but about recognizing fundamental value and potential before the majority does.

That is how my real study of the world of digital assets began, along with the formation of my own vision of the industry's future. Sometimes everything starts with a single coincidence that becomes a turning point…

Part I: Do Your Own Research

When a new "promising" project name starts circulating in the information space—one that's supposedly about to list on a major exchange—and people in your communities are enthusiastically discussing its upside, it's very easy to believe you're looking at a unique opportunity. In moments like these, it feels like all the stars have aligned and the market itself is signaling the right move.

This is exactly where one of the most common traps for beginners lies. A sense of urgency kicks in, along with the fear of missing out (FOMO) and the conviction that this is the perfect entry point at the lowest possible price. In reality, this kind of emotional logic often leads to decisions you later regret. The outcomes vary—from partial losses in a milder scenario to a complete wipeout of capital accumulated over years.

That's why the ability to pause, step back from the hype, and engage a rational mindset is critical. The core rule is simple, yet often ignored: always Do Your Own Research (DYOR).

Most new investors underestimate the true value of this approach. Analysis is often postponed—or skipped entirely—as if it doesn't really matter. From my experience, this is one of the most dangerous gaps in thinking. The sooner you learn to close it, the lower your chances of ending up in a project sustained purely by headlines and short-term hype.

To better understand the importance of pre-investment analysis, let's look at two vivid examples:

- **Meme Coin TRUMP (Solana, 2025)**

After January 17, 2025—just days before the inauguration—Donald Trump, already elected President of the United States, became associated with the launch of the TRUMP meme coin on the Solana network. The initial price ranged between $7 and 8 per token. The total supply was 1 billion tokens. but only 200 million were made available to the public during the initial offering. The rest remained under the control of affiliated entities with privileged access to the project.

Hype quickly accelerated on the social platform X, and the following day it was amplified by public statements from Donald Trump himself. For many, that was enough to enter the asset without asking deeper questions or analyzing the project's structure, token distribution, or potential risks.

Source: Donald Trump's post on the social network X | **Wikipedia**

Within just 24 hours, the price of TRUMP surged from $7–8 to approximately $75. This triggered a wave of excitement and the feeling that the market had just created another "golden opportunity." But the euphoria didn't last long. By January 19, the price began correcting rapidly, dropping to around $37. Through February and March, the decline continued, eventually stabilizing near $10.

Source: TRUMP token price chart | **TradingView**

The outcome was predictable.

Social media quickly filled with stories from investors sharing their experiences. For many, it was painful. People invested under emotional pressure, trying to catch the "last train" they believed would deliver quick and easy profits.

I observed the consequences not only online but also within my own circle. There were real cases where acquaintances lost a significant portion of their savings. The reason was simple—and telling: they trusted a high-profile name, the project's official image, and its public backing without taking the time to analyze its structure, token allocation, or possible scenarios.

As of late 2025, the Official Trump token continues trading on exchanges within the Solana ecosystem, as well as on Coinbase, at around $5 with a market capitalization of approximately $1 billion.

At first glance, these metrics may seem like proof of the project's viability—but this is exactly where deeper analysis is required. One particularly revealing detail: in January 2025, 8 out of the top 10 centralized exchanges listed TRUMP in an extremely short timeframe.

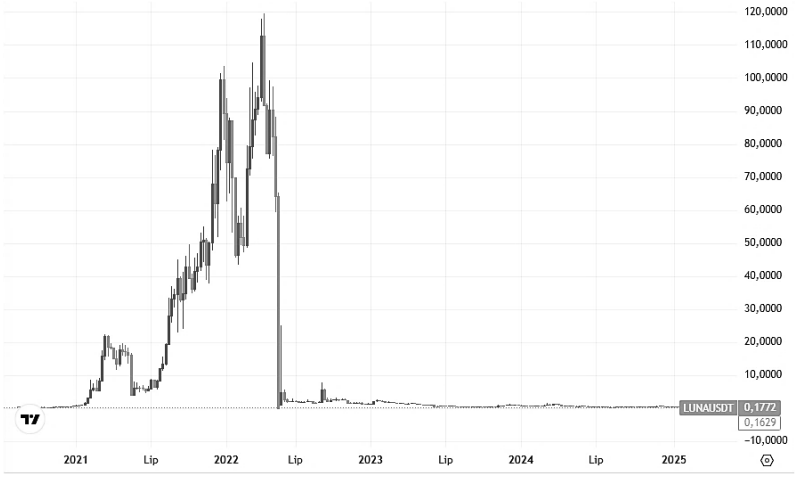
On average, listings occurred within 48 hours, whereas the standard due diligence process for new assets typically takes around 129 days. This kind of speed is highly atypical behavior from exchanges and deserves scrutiny.

- **Stablecoin LUNA(Terra, 2022)**

Another high-profile case that left a lasting mark on the crypto community is the collapse of the Terra ecosystem and its stablecoin UST in 2022. At the time, the project looked exceptionally attractive: a standalone blockchain focused on decentralized finance (DeFi), with its own ecosystem of services and—most importantly—an algorithmic stablecoin pegged to the US dollar.

UST's peg mechanism wasn't backed by real reserves but relied on its relationship with the LUNA token. When demand for UST increased, LUNA was burned when demand dropped, additional LUNA was minted. In theory, this model was designed to function as a self-regulating system.

There was also a highly attractive yield component. The Anchor protocol, closely associated with the Terra team, offered nearly 20% annual returns through staking. For many investors, this looked like the perfect combination of innovation and stable income. The problems began when UST lost its dollar peg.



Source: LUNA token price chart | **TradingView**

Events unfolded like an avalanche. Investors rushed to exit UST, swapping it for LUNA. This triggered a massive increase in LUNA's supply and an immediate price collapse.

Within days, tokens that had recently been valued above $100 effectively became worthless, dropping close to zero. The result: billions in losses and thousands of investors left with completely devalued assets.

Both examples—TRUMP and Terra LUNA—clearly demonstrate why understanding a project's internal structure is critical. You need to know who is behind the project, how decisions are made, where control is concentrated, and what truly underpins the economic model.

In the case of TRUMP, a significant portion of the supply was controlled by affiliated entities, creating the potential for manipulation from the outset. Terra went even further: the UST stablecoin model had no real backing in fiat reserves or stable assets. The entire system depended on its algorithmic link to LUNA—which proved fragile under market stress.

When control over an asset or its key mechanisms is concentrated in the hands of a few, it almost always signals elevated risk. Sharp price volatility, opaque decision-making, and unpredictable outcomes for retail investors become the rule—not the exception.

At this point, you should already be forming a foundational understanding of why DYOR is not just a formal recommendation but a real risk management tool.

Before buying any asset, it's worth honestly answering a few simple but critically important questions:

- Who exactly issued this token?
- Who controls the majority of the supply?
- What is the vesting (unlock) schedule?
- Is the team public, and is there a clear roadmap?
- Does a real product exist, and what tangible value does it create?

Even this basic checklist can help you avoid decisions driven by emotions and social media hype—and, as a result, avoid financial losses. The deeper your understanding of a project's structure, the lower the likelihood that you'll end up serving as exit liquidity for other market participants.

All of these examples lead to one simple conclusion: the market does not reward belief in names or loud promises—it rewards an understanding of fundamental value.

Hype can create the illusion of opportunity, but only fundamentals provide a real chance at long-term success. That's why proper research starts not with emotion but with a clear, rational analysis of a project's structure, incentives, and intrinsic value.

The only thing that consistently works in an investor's favor is structured thinking and investment in their own knowledge. The deeper your understanding of the underlying processes, the less room there is for impulsive decisions and external manipulation.

In this chapter, we will build a foundational toolkit and analytical framework to help you transform chaotic information noise into a clear, structured perspective—and make decisions from a place of awareness, not reaction.

Park II: Market Scanning

Conducting a Top-Layer Information Scan:

- **Step One**

The process of market evaluation can be described as a dual-factor approach, which I refer to as a "parallel model." The top layer of this model focuses on analyzing the broader digital landscape within a specific market cycle or stage of industry development.

At this level, you're working with a wide range of sources: analytical reports from leading investment funds, news coverage, independent research, and key narratives discussed at global industry conferences. This perspective allows you to identify major trends, structural shifts, and strategic vectors that shape current market dynamics and define the future direction of the digital asset ecosystem.

To better understand this approach, it's helpful to briefly look at previous industry cycles.

During the 2015–2018 period, we saw the emergence of new blockchain platforms and the early formation of the decentralized finance (DeFi) sector. This was a phase of large-scale experimentation with network architecture, smart contracts, and financial primitives—laying the groundwork for more mature solutions and broader adoption.

The next cycle, from 2019 to 2021, introduced a different set of dominant trends. The market was overtaken by the explosive rise of NFTs and the concept of the metaverse. These developments didn't just shift attention—they created entirely new modes of interaction between digital assets, culture, gaming environments, and virtual identity.

The current cycle, which began in 2022 and continues today, has introduced new segments into the digital landscape. Among the most prominent are RWA (Real-World Asset tokenization) and AI integration—including the incorporation of artificial intelligence into smart contracts, DAOs, generative platforms, and new models for analytics and forecasting. These innovations are gradually reshaping how digital projects are managed and how decisions are made.

These directions consistently remain at the center of industry attention. They dominate headlines in specialized media, are deeply analyzed in research reports, and are actively discussed across professional communities and social platforms.

At its core, the top layer can be distilled into one key principle: focus on the innovation component. It either creates an entirely new market segment—driving technological breakthroughs (as with tokenized real-world assets)—or significantly accelerates the development of existing verticals such as smart contracts, blockchain protocols, or DeFi.

A strong indicator of potential is sustained interest from multiple stakeholders: users, developers, media, venture capital, and industry thought leaders.

At the same time, it's critical to recognize that the digital asset space is saturated with noise. Every day brings dozens of new hypotheses, announcements, and so-called "hot trends"—many of which lack real fundamental value.

Examples of this noise include:

- Meme tokens with no technological or economic foundation
- Assets with no clear use case, created purely for speculation (such as the Trump token)
- Event-based betting platforms with questionable long-term viability or weak integration into the broader digital ecosystem

That's why one of the key skills at this stage is the ability to filter out secondary narratives and focus on trends that create long-term value or serve as foundational infrastructure for future growth.

In this context, simple but powerful questions become essential:

- What problem does this emerging segment solve or improve?
- What are its long-term prospects in real-world or digital contexts?

These questions help distinguish hype from fundamentals and build a structured evaluation framework—from technological potential to long-term socio-economic impact.

- **Step Two**

Once you've identified promising directions, the next step is to move to a parallel layer of analysis: examining where venture capital and institutional money are flowing. These players often shape the primary vectors of industry development and lay the foundation for future trends.

At this stage, focus on analyzing funding rounds:

- Which sectors are attracting the most capital?
- Where is funding consistently being deployed?
- Which projects are gaining the trust of institutional investors?

This approach provides insight into which market segments are considered strategically important in the medium to long term.

Special attention should be given to Tier 1 investors—leading venture funds that not only deploy significant capital but also actively shape market narratives and strategic direction. These include firms such as Coinbase Ventures, HashKey Capital, Galaxy, and others whose involvement often signals strong potential in a project or sector.

In the current market cycle (starting in 2022), several key sectors have attracted the most funding:

1. **Infrastructure**.

New blockchains, scaling solutions, Layer 2 protocols, and cloud-based blockchain services that form the backbone of ecosystem growth.

2. **DePIN (Decentralized Physical Infrastructure Networks)**.

Telecommunications, energy, compute, and data networks where blockchain coordinates and incentivizes participants.

3. **AI + Blockchain Convergence**.

Integration of AI into Web3 protocols, including generative systems, autonomous agents, and advanced analytics—reshaping data management and decision-making.

Another critical skill at this stage is understanding market cycles. Knowing which phase a trend or narrative is in allows for significantly more informed investment decisions.

Helpful guiding questions include:

- Is the trend in its early emergence phase?
- Is it experiencing active growth?
- Has it already matured into a fully developed segment of the digital landscape?

In my view, this stage is foundational.

It establishes the baseline from which a beginner begins to build a structured understanding of the market. This was also my own path. From your current vantage point, you can already evaluate past trends—seeing which lived up to expectations and which did not. At the same time, you can identify emerging narratives that are still early but show clear potential for future integration.

The ability to connect past, present, and future perspectives is the foundation of strategic thinking in digital asset markets. Understanding whether a technology or segment is at inception, growth, or maturity provides a clear view of the risk-to-reward ratio.

This is similar to investing in real estate during early construction stages: the risks are higher, but so is the potential return. The same applies in digital markets—recognizing the right phase early opens access to opportunities long before they become mainstream.

- **Step Three**

After completing the previous steps, you should already have identified specific segments and categories that are attracting significant capital and strong venture support. The next step is to conduct a detailed screening of these areas using leading digital asset market aggregators.

Start by analyzing active projects within the selected segment. This helps you:

- Understand the current competitive landscape
- Identify strong players with solid fundamentals
- Determine which blockchains, ecosystems, or protocols serve as the foundation for development within the segment.

Next, analyze emerging projects launched in the current cycle. This provides insight into how the segment is evolving, highlights innovative approaches, and reveals early-stage trends approaching broader adoption.

These insights can be systematically organized using aggregator platforms through sections like:

- "Categories" and "Subcategories"
- Specific verticals such as RWA, AI, DePIN, Layer 2, etc.

Finally, evaluate early-stage projects still in funding or development phases. Use aggregator sections such as:

- "Fundraising"
- "Deal Flow"
- "Token Sale Calendar"

These tools allow you to track:

- Who is investing
- Which funding rounds have been completed
- What stage of development or launch each project is in

It's also important to cross-reference data across multiple sources to minimize bias and build a more objective market view.

This three-layered approach builds a critical skill: the ability to construct a structured, data-driven understanding of a chosen segment and make informed decisions.

It helps answer key questions:

- Which active projects are segment leaders, and how sustainable are they?
- What new and promising projects or blockchains have launched or are preparing to launch?
- Are new projects evolutionary improvements—or true breakthroughs solving real problems?
- Has the segment reached maturity as a stable and fully formed part of the digital landscape?

Each of these questions helps assess the development level of a sector, understand its fundamentals, identify emerging players, and determine whether they deliver genuine innovation or simply reinforce existing solutions.

As you continue practicing and exploring the market, you'll discover remarkable projects, ecosystems, and global narratives. That's the core objective of market research.

If new projects enhance existing solutions (for example, Layer 2 scaling solutions for Ethereum), the next step is to move to the lower layer of analysis—focusing on a deeper evaluation of their real impact on the ecosystem. This includes analyzing their interaction with base-layer protocols, adoption levels, and their ability to scale efficiently without compromising performance.

Part III: Fundamental Analysis

We now move into a deeper scan of the underlying information layer:

- **Whitepaper**

At this stage, you already have a shortlist of specific projects that have captured your attention, along with a general sense of their potential and innovation within the digital landscape. However, this is still not enough to make a well-founded decision. To transform an initial, somewhat abstract assessment into a clear and strategically grounded understanding, we move to the lower "layer" of our two-factor model—the deepest and most critical level of analysis.

This is where in-depth research of potential projects takes place, involving a thorough evaluation of their fundamental strength, technical viability, and market positioning within selected segments. This approach helps avoid superficial conclusions and ensures that the final selection aligns not only with a long-term vision but is also fundamentally sound at the level of each individual project. A key skill in this process is the ability to filter out short-term informational noise and focus on truly meaningful growth drivers. That's what allows you to concentrate on projects with not just current relevance but genuine long-term growth potential.

The central tool at this stage is the official technical document—the Whitepaper. It enables you to analyze a project from multiple angles: from technological innovation to economic viability and its role within a broader ecosystem. In essence, a whitepaper is a research document that comprehensively outlines both the technical and economic aspects of a digital project. It is created directly by the development team and is designed to explain the problem the project solves and the proposed solution and to serve as a guide for potential investors, users, and partners. Additionally, it reflects the team's mindset, strategic vision, and level of execution—critical elements when assessing a project's credibility.

For a whitepaper to be truly informative and valuable for analysis, it should meet several core criteria:

1. **Sufficient depth**.

Typically no fewer than 10 pages, ensuring all key aspects are covered with the necessary level of detail.

2. **Comprehensive project overview**.

Clearly defined objectives, origin context, role within the digital environment, and long-term vision.

3. **Technological core**.

A detailed description of the architecture, performance, security model, and underlying protocols.

4. **Functionality**.

Real-world use cases across both Web3 and traditional environments.

5. **Economic model**.

Special attention to tokenomics (if a token is involved), including distribution, inflation mechanisms, utility, and incentive structures.

6. **Development strategy**.

Current project status, roadmap, implementation phases, and long-term objectives.

Beyond the core structure, it's important to consider additional parameters that help evaluate the quality of technical execution:

7. **Network architecture**.

Levels of reliability, scalability, security, and decentralization

8. **Consensus mechanism**.

Type, efficiency, and resource consumption.

9. **Innovation**.

The project's ability to introduce new solutions or significantly improve existing approaches, such as integration with AI.

10. **Ecosystem**.

Availability of developer tools, an active community, open-source code, clear documentation, and the presence of SDKs and APIs.

11. Compatibility.

Interoperability with other networks and systems directly impacts the project's practical value and integration potential.

A comprehensive approach to analyzing a whitepaper allows you to filter out superficial and speculative ideas, focusing instead on projects with real technical foundations, well-designed economic models, and realistic implementation strategies. This is a critical step for anyone aiming to make decisions based on structure and data—not hype.

Some teams also publish a shortened version of the document—a Light Paper. This is a simplified format for a broader audience, but it should still include key elements: a clear vision, implementation plan, technical foundation, market understanding, and proposed solutions. Even from such a document, you can form an initial judgment on whether the team is genuinely building an innovative product or simply trying to ride a wave of market hype without a real strategy.

It's worth emphasizing that having a full-fledged Whitepaper prior to a project's launch is one of the key indicators of its seriousness. If such a document is missing—or if it reads more like a marketing brochure without substantive technical and economic depth—that's a clear signal not to invest your time or capital in the asset.

At this level, another critically important skill begins to take shape: the habit of working systematically with technical documentation. This skill enables you to evaluate a project's real potential, its scalability, and its readiness for integration into the future digital landscape.

- **Team Composition**

Within the framework of fundamental analysis, special attention should be given to the team behind a project, as their experience, expertise, and stability often determine its success. First and foremost, it's essential to evaluate key individuals—particularly executives and technical leaders. The goal is to understand whether they have a proven track record in the crypto industry or related fields, what projects they've previously built, and how successful those initiatives were. This typically involves analyzing

open sources, professional profiles, public appearances, and participation in industry events, including content available on streaming platforms.

It's equally important to assess the size and stability of the team. Sudden downsizing after launch can be a red flag, signaling internal issues. A critical indicator is actual development activity, which can be tracked through the frequency and consistency of updates in public repositories. Adherence to the stated roadmap is another strong signal of organizational discipline and accountability.

The technical stack also plays a key role. Widely adopted programming languages provide access to a larger developer base and proven solutions, making scaling more efficient. At the same time, emerging languages may indicate innovation potential and the formation of a new technological wave. In this context, it's also important to evaluate the availability of SDKs, APIs, technical documentation, hackathons, and educational initiatives—all of which shape the accessibility and attractiveness of the ecosystem for developers.

Another important factor is the presence of advisors and partnerships with recognized organizations or institutional players. These relationships can enhance credibility, but they should be verified through actual activity, public mentions, and participation in joint initiatives—not just logos displayed on a website.

Governance structure also deserves close attention. If a project claims decentralization, it's important to assess how this is implemented in practice—whether voting mechanisms exist and how key decisions are made. A realistic and consistent roadmap further reflects the project's maturity and strategic clarity.

Ultimately, a team is more than just a list of names. Their experience, consistency, technical activity, transparency, and engagement with the community must all be carefully evaluated as part of your DYOR process to form well-grounded conclusions about the project's long-term potential.

- **Project Tokenomics**

At this stage, an attentive reader—or a more experienced researcher—may naturally raise a question about the role of tokenomics. And that's entirely

justified, as it is one of the core components in evaluating any digital asset. The financial model directly impacts the project's growth trajectory, the incentives of ecosystem participants, and its ability to scale under real market demand.

Tokenomics determines whether a project can sustain long-term interest, maintain liquidity, and ensure stability and overall investment appeal. Without a clear understanding of the underlying economic logic, it's impossible to objectively assess an asset's viability—even if it's backed by a strong team and cutting-edge technology.

That's precisely why tokenomics deserves a separate and in-depth analysis. In the next section, we'll take a closer look at its key elements, including distribution models, inflation mechanisms, incentive structures, the functional role of the token within the ecosystem, and the associated risks.

- **Market Potential Assessment**

This stage is a logical continuation of the key question raised in the third step of the upper layer: which projects are already segment leaders, and how sustainable are they in the long term? This is where the analysis deepens through comparing emerging solutions with established players, evaluating their competitiveness, unique advantages, and ability to complement or transform the existing market landscape.

Market potential assessment, as a component of fundamental analysis, helps determine the real prospects for scalability, profitability, and long-term viability. It takes into account not only the project's internal fundamentals but also its ability to integrate into existing markets—or to create entirely new ones.

First, it's important to identify whether the project is an autonomous blockchain solution building its own ecosystem (such as Sui) or if it operates within an already established ecosystem infrastructure (like Ondo on the Ethereum network).

Once the project type is defined, the next step is to evaluate the scale of the market it aims to capture—its TAM (Total Addressable Market). This can range from a narrow niche (such as GameFi, wallets, or specific Web3

services) to broader infrastructure solutions, including oracle protocols or cross-chain bridges within DeFi. Assessing TAM provides insight into the potential user base, application scope, and overall growth runway.

In most cases, new projects begin within niche segments, where they can test their product under real market conditions. Successful execution opens the path to scaling, expanding into broader markets, and gradually building a full-fledged ecosystem—one that fosters the emergence of additional specialized solutions and complementary projects.

It's also critical to consider one key factor: if a new project is developed within an established ecosystem, it gains immediate access to existing infrastructure, users, and liquidity. This significantly enhances market reach, improves financial resilience, and accelerates growth. Conversely, if the project is autonomous, it requires strong backing from investors, substantial financial resources, and the ability to compete with already established players to achieve sustainable development.

- **Selection Metrics**

At this stage, the analysis shifts toward a deeper understanding of the project and a critical validation of whether its ambitions and ideas are supported by a real technological foundation. It's essential to assess the state of the network, the stability of its core components, and the system's ability to handle load, scale efficiently, and integrate into the broader digital landscape.

Objective technical indicators help filter out informational noise and distinguish genuine activity from superficial signals, allowing for a more accurate evaluation of a project's long-term development potential. Core metrics provide a fast and structured way to assess the scale and momentum of an ecosystem, compare multiple solutions, and identify the most promising candidates for deeper analysis.

Based on these metrics, the next section introduces the key indicators that form the foundation of market and financial analysis—ultimately enabling well-informed, data-driven investment decisions.

Part IV: Market and Financial Analysis

We continue the deep scan of the lower layer, relying on core indicators applicable across all types of projects.

- **Market Capitalization**

METRIC	RANGE	INTERPRETATION
Market Cap	From $50B+	**Ultra-cap**: market leaders with high levels of trust and liquidity. Strategically significant assets.
	From $10B to $50B	**Large-cap**: stable projects with a notable market share and actively utilized ecosystems.
	From $1B to $10B	**Mid-cap**: projects with growth potential, moderate liquidity, and steady market activity.
	From $500M to $1B	**Lower mid-cap**: higher-risk assets with the potential for rapid growth under increasing demand.
	From $50M to $500M	**Small-cap**: early-stage projects with limited liquidity and elevated investment risk.
	From $0 to $50M	**Launch stage**: new or experimental projects with minimal market presence and liquidity.

Table: Classification by Market Capitalization Level

Market capitalization is calculated as the current token price multiplied by the circulating supply. It reflects the total market value of a project and helps assess its scale within the digital ecosystem.

For ecosystem-based blockchains, market capitalization also serves as an indicator of the overall development and maturity of the ecosystem. At the same time, a lower market cap may signal significant growth potential—especially if the project operates within a high-potential, rapidly expanding segment.

Practical Guidelines for Evaluating Market Cap:

- **$5M to $50M:** typically considered early-stage investment opportunities.
- **$20M–$50M:** characteristic of projects that have moved beyond the initial phase but still retain substantial upside potential.
- **Above $10B:** generally indicates a mature asset with strong investor confidence and a leadership position within its segment.

- **Fully Diluted Valuation (FDV)**

A metric that reflects the project's potential total value under the assumption that all tokens—either already in circulation or scheduled to be released—are fully unlocked. It is calculated as the current token price multiplied by the maximum total supply defined by the tokenomics.

Comparing FDV with market capitalization is a critical component of fundamental analysis, as it helps assess inflation risk, potential investor dilution, and the project's true scale at its current stage.

When FDV is close to market cap, it indicates that most tokens are already in circulation. In this scenario, inflationary pressure is minimal or non-existent, and dilution risk for new investors is low. This structure is typical of mature projects, such as Bitcoin, where the majority of issuance has already occurred.

METRIC	EXAMPLE	INTERPRETATION
FDV / Market Cap	Market Cap—$300M FDV—$350M → **Dilution ≈ 1.17**	Most tokens are already in circulation—low dilution level and minimal investor risk.
	Market Cap—$50M FDV—$500M → **Dilution = 10**	A small portion of tokens is in circulation—elevated risk of price pressure due to future token unlocks.

Table: Capital Dilution Assessment

If FDV significantly exceeds market cap, it suggests that only a small portion of tokens is currently circulating. The remaining supply may enter the market through unlock schedules, future emissions, or incentive programs—creating inflation risk and potential downward pressure on price. This situation is most commonly observed in early-stage projects, particularly within DeFi and GameFi segments.

Practical Rule of Thumb:

- **FDV-to-Market Cap ratio above 3–5x** signals significant future token supply expansion and increased price risk.
- **A ratio close to 1** indicates that most tokens are already circulating, with minimal dilution risk for investors.

- **Trading Volume**

A metric representing the total value of all buy and sell transactions of a token over a specific period, most commonly within the last 24 hours. It can be analyzed both on individual exchanges and in aggregate across the entire market, providing a clear view of an asset's real liquidity level.

For large-cap and highly capitalized assets, trading volume is an especially important indicator. Even with a high market capitalization, low Trading Volume may signal declining market interest or artificial price stability without genuine demand.

Comparing Trading Volume with Market Capitalization helps assess liquidity and overall market attention. A high trading volume relative to Market Cap indicates that the token can be easily bought and sold without significantly impacting price. This typically reflects active participation from large market players, heightened trader interest, or a phase of active position redistribution.

Moderate and stable trading volume—especially in already established projects—often suggests price range support by market makers and the formation of an accumulation zone. This condition is commonly observed during consolidation phases preceding potential upward or downward momentum.

Low Trading Volume signals weak interest in the asset. In such conditions, entering or exiting positions becomes more difficult, and even

relatively small trades can cause sharp price fluctuations. This increases volatility and creates a favorable environment for manipulation, particularly in small-cap projects.

METRIC	EXAMPLE	INTERPRETATION
Market Cap / Trading Volume	Market Cap—$500M Trading Volume—$75M → **15%**	High liquidity—strong market interest in the asset.
	Market Cap—$200M Trading Volume—$55M → **7.5%**	Neutral zone—moderate level of market interest.
	Market Cap—$100M Trading Volume— $0.5M → **0.5%**	Low liquidity—lack of interest or the project is in a declining phase

Table: Liquidity Assessment

Practical Rule of Thumb:

- **High Trading Volume-to-Market Cap ratio (above 10%)** indicates active trading, strong liquidity, and significant market interest.
- **Mid-range (1–10%)** reflects moderate liquidity and stable, but non-peak, interest.
- **Low ratio (below 1%)** suggests weak trading activity, declining interest, or that the project is in stagnation or decline.

- **Number of Unique Token Holders**

A metric that reflects the number of distinct addresses holding a token in their wallets. The higher the number of such addresses, the broader the distribution of the asset among users and investors. This generally indicates a lower level of centralization and a reduced risk of price manipulation by large holders.

It is important to note that the number of addresses does not equal the number of real users. However, the growth trend in unique wallets remains a meaningful indicator of interest and engagement with the project.

METRIC	EXAMPLE	INTERPRETATION
Unique Holders	Token A total supply: 1,000,000 Unique holders: 250,000 Top 10 wallets: 750,000 → **75%**	As we can see, the top 10 wallets hold 75% of all Token A supply, indicating an extremely high level of centralization and control by a small group of participants.
	Token B total supply: 1,000,000 Unique holders: 80,000 Top 10 wallets: 400,000 → **40%**	In the case of Token B, the top 10 wallets control 40% of the total supply. This reflects moderate centralization with a limited but still noticeable influence of large holders.
	Token C total supply: 1,000,000 Unique holders: 45,000 Top 10 wallets: 250,000 → **25%**	For Token C, the top 10 wallets control 25% of the total supply. This indicates a high level of decentralization and relative stability, as the influence of large holders is limited.

Table: Decentralization Assessment via Token Distribution

At the same time, it is important to consider the project's development stage. In early-stage projects that have just entered the market, a significant portion of tokens may still be locked according to the tokenomics model. In such cases, temporary concentration of assets in certain wallets is not necessarily a negative signal and often reflects technical or economic constraints embedded at launch.

An increasing number of unique holders combined with a gradual decrease in token concentration among large wallets is a positive signal for the long-term stability of the project.

Practical Rule of Thumb:

— A share of tokens held by the top 10 or top 100 wallets above 70% indicates excessive centralization.

- Above 50% signals a high concentration risk.
- Below 50% is considered moderate.
- Below 30% typically reflects a well-decentralized and more resilient ownership structure.

DeFi Project Evaluation Metrics

Since this sector aggregates digital financial services and offers a broad range of financial instruments, it is essential to analyze both the efficiency and real-world outcomes of their usage—at the level of individual blockchain networks as well as across entire ecosystems.

- **Total Value Locked (TVL)**

This metric represents the total value of assets locked within a protocol. Depending on the financial instruments used by the project, these assets may be staked (for example, in the case of Lido), placed in liquidity pools (as on Uniswap), or supplied to lending platforms, particularly within ecosystems such as Avalanche. TVL is a key indicator of a protocol's scale and the level of user trust in the network.

For mature and consistently active projects, special attention should be paid to TVL dynamics. Sustained growth or stable retention of TVL signals protocol reliability, while sharp fluctuations may indicate technical issues, loss of user confidence, or mass liquidity withdrawals—often associated with seasonal cycles and profit-taking events.

METRIC	EXAMPLE	INTERPRETATION
TVL (Total Value Locked)	Was: $1B → Now: $1.5B	Growth in TVL—users have greater trust in the protocol, deposit more capital, and liquidity is increasing.
	Was: $2B → Now: $1.2B	Decline in TVL—capital is exiting the protocol, indicating reduced trust and lower user activity.

Table: Protocol Health Assessment by Liquidity Level

When evaluating early-stage projects with low TVL, it is important to analyze the growth rate over a defined period—monthly, quarterly, or yearly. Consistent positive dynamics in this context indicate active liquidity inflows and strong potential for further development.

Analyzing the relationship between Market Cap and TVL helps assess the balance between a token's market valuation and the actual capital deployed by users. This provides insight into both trust in the protocol and its financial stability.

Market Cap reflects the total market value of a project based on the current token price and circulating supply.

TVL (Total Value Locked) represents the actual amount of user funds deposited into the protocol—such as staking, liquidity pools, or lending platforms.

If market Cap significantly exceeds TVL, it may indicate that the asset is overvalued by the market. In other words, the token price is higher than the actual user-backed liquidity, creating increased downside risk in case of declining interest or weak protocol activity. This situation is often observed in newer projects or narrative-driven assets, where investor expectations exceed actual user participation.

METRIC	EXAMPLE	INTERPRETATION
Market Cap / TVL	Market Cap — $800M, TVL — $1B → **0.8**	Undervalued project — market capitalization is lower than real liquidity volume.
	Market Cap — $2B, TVL — $1B → **2.0**	Balanced ratio — the asset is fairly valued by the market.
	Market Cap — $5B, TVL — $1B → **5.0**	Overvalued asset — high probability of speculation or inefficient liquidity utilization.

Table: Fair Valuation of a Project

Conversely, if Market Cap is lower than TVL, the project may be undervalued. This suggests that users have already committed significant capital but the market has not yet fully reflected this value. In such cases, the token may have upside potential, while the protocol demonstrates strong user trust and capital backing

Practical Rule of Thumb:

- **Below 1** → market undervaluation.
- **1 to 3** → fair market valuation.
- **Above 3** → overvalued project.

A supplementary metric for assessing speculative interest in a token is Trading Volume. It reflects the buying and selling activity of the asset on the market and helps evaluate its liquidity as well as the risks associated with entering or exiting positions.

A key element in volatility assessment is the Market Cap to Trading Volume ratio: the higher this value, the higher the potential volatility tends to be. At the same time, sharp changes in trading volume may indicate increased market participant interest.

An important exception applies to projects ranked within the top 15–20 by market capitalization: they may show a relatively low volume ratio—below 5% of Market Cap—while still maintaining high absolute liquidity and safe trading conditions.

METRIC	EXAMPLE	INTERPRETATION
Market Cap / Trading Volume	MC — $100M, TV — $50M (**50% of MC**)	High trading activity — strong speculative interest, high liquidity, easy entry and exit from positions.
	MC — $100M, TV — $5M (**5% of MC**)	Low trading volume — weak interest in the token, exit liquidity may be limited, and price manipulation risk increases.
	MC — $100M, TV — $0.5M (**0.5% of MC**)	Very low liquidity — high-risk investment: even small trades can cause significant price fluctuations.

Table: Assessment of Market Interest in an Asset

Practical Rule of Thumb:

- **Above 10% of Market Cap** → sufficient liquidity.
- **Below 5% of Market Cap** → low liquidity risk.
- **Above 0.5% of Market Cap** → sufficient liquidity (only high-cap projects and above).

Special attention should be paid to both daily and 30-day trading volumes. Daily volume reflects short-term market activity and serves as a fast indicator of the asset's current state. In contrast, the 30-day volume is more important for long-term analysis, as it helps identify structural changes within market cycles. This metric often reveals assets with stable underlying support, as their trading volumes tend to decline less significantly relative to averages even during bearish trends.

Practical Rule of Thumb:

Middle-cap & Below:

- Daily volume above $250M
- 30-day volume above $3–4B

Large-cap & Above:

- Daily volume above $500M
- 30-day volume above $8-10B

- **Protocol Revenue**

Protocol revenue refers to the total income generated by a blockchain protocol over a defined period (daily, monthly, or yearly) through sources such as user fees, trading fees, service charges, interest spreads, liquidation penalties, and other protocol-level earnings. It represents the actual economic value captured from user interactions and on-chain activity within the system.

This metric is an important indicator of a protocol's financial health, efficiency, and sustainability. It helps assess whether revenue is generated consistently or depends on short-term or sporadic usage, as well as how effectively the protocol converts user activity and engagement into real economic output. Over time, it can reveal patterns such as organic growth, cyclical demand, or sensitivity to broader market conditions.

Protocol revenue is also widely used for benchmarking across projects and ecosystems. It enables comparison of different protocols within the same sector, helping to identify which ones generate stronger income and demonstrate better product-market fit. Additionally, it provides insight into how efficiently locked liquidity (TVL) is being utilized, highlighting the protocol's ability to generate sustainable value relative to its capital base.

METRIC	EXAMPLE	INTERPRETATION
Revenue	Revenue grows: from $1M → $5M, TVL stable at $500M	High liquidity utilization—active user engagement, efficient protocol model.
	Revenue fluctuates: from $3M → $0M, TVL stable at $400M	Large swings—unstable user interaction, inconsistent protocol usage.
	Revenue remains~ 0, TVL stable at $200M	No meaningful user activity—liquidity is inefficiently utilized.

Table: Protocol Revenue Assessment

Practical Rule of Thumb:

- **Growing Revenue →** signals healthy demand and efficient TVL utilization.
- **Stable Revenue + stable TVL →** balanced and sustainable business model.
- **Low or zero Revenue →** weak activity and inefficient liquidity usage.

- **Comparison of Revenue and Market Cap**

This metric evaluates how well a project's market capitalization corresponds to the actual revenue generated by the protocol. In other words, it shows how efficiently the invested capital is being utilized relative to the income produced.

For early-stage projects in development, low revenue is not necessarily a critical issue however, it requires continuous monitoring and careful analysis of trends. In contrast, for more established projects, a low revenue-to-market-cap ratio may indicate weak market adaptation, an inefficient business model, and potential risks for investors.

METRIC	EXAMPLE	INTERPRETATION
Revenue / Market Cap	Revenue — $50M, MC — $400M → **0.125 (12.5%)**	10%—high efficiency, strong revenue generation, and a solid, sustainable business model.
	Revenue — $30M, MC — $450M → **0.067 (6.7%)**	5–10%—moderate efficiency the trend should be closely monitored.
	Revenue — $10M, MC — $500M → **0.02 (2%)**	<5%—low efficiency, potential overvaluation risk, requires deeper analysis.

Table: Protocol Capital Efficiency Assessment

Practical Rule of Thumb:

— **Above 10%** → the protocol generates strong revenue the economic model appears robust and stable.

— **5–10%** → medium level of profitability.

— **Below 5%** → low revenue efficiency, which may indicate an ineffective economic model and increased investor risk.

- **Active Engagement Metric (Active Users)**

The user engagement metric reflects the number of individuals who regularly interact with the protocol or participate in its ecosystem. This indicator is important not only for assessing the scale of a project but also for understanding the quality of user activity, which directly impacts the sustainability of the business model and the protocol's potential revenue generation.

User engagement is typically analyzed through two core metrics:

- ***DAU*** — Daily Active Users
- ***MAU*** — Monthly Active Users.

METRIC	EXAMPLE	INTERPRETATION
DAU / MAU	DAU = 8 000, MAU = 15 000 → **ratio = 0.53**	≥0.4—high user engagement, strong and consistent interaction with the protocol.
	DAU = 5 000, MAU = 15 000 → **ratio = 0.33**	0.2–0.4—moderate engagement, stable usage with regular user return.
	DAU = 1 500, MAU = 15 0000 → **ratio = 0.1**	0.1–0.2—low engagement, users interact only periodically or seasonally.

Table: Assessment of User Activity in the Protocol

The DAU/MAU ratio helps evaluate how frequently users return to the protocol and how strong user retention is within the ecosystem. A higher ratio indicates regular product usage, while a lower one may suggest sporadic or event-driven interest.

At the same time, it is important to note that low engagement is not always a critical red flag on its own. In many cases, the key factor remains the protocol's ability to generate revenue. If a project maintains stable income even with a limited number of active users, this may indicate an efficient business model and long-term resilience.

Practical Rule of Thumb:

- **Above 0.4** → high activity and strong user engagement.
- **0.2–0.4** → normal engagement with a stable user base.
- **0.1–0.2** → weak engagement, irregular user retention, elevated risk.

Lending Sector Project Evaluation Metrics

This sector is focused on lending and liquidity management, so its evaluation should be based on how efficiently protocols utilize deployed capital and how consistently they operate within the broader ecosystem.

- **Utilization rate / Active loans**

This metric reflects what portion of the total value locked (TVL) in a lending protocol is actually deployed as active loans. In simple terms, it shows the ratio between the total amount borrowed and the total assets supplied to the protocol. This makes it a direct measure of how effectively deposited capital is being put to work.

This metric is specific to lending platforms and DeFi credit protocols, and it serves as a key indicator of capital efficiency. The higher the utilization rate, the larger the share of locked capital actively generating yield through interest payments and fees—for both lenders and the protocol itself. It also often correlates with higher borrowing demand, which can drive dynamic interest rate adjustments within the protocol.

At the same time, an excessively high utilization rate sustained over a long period may signal potential liquidity constraints. If TVL is not growing, the protocol may lack sufficient available liquidity to process withdrawals or issue new loans, increasing risk for both borrowers and liquidity providers. In extreme cases, this can lead to sharp interest rate spikes or reduced accessibility to credit.

This becomes particularly evident during periods of declining market activity or heightened volatility. To avoid misleading conclusions, it's important to evaluate this metric over time—ideally across a 1–2 year horizon. This approach accounts for market seasonality, cyclical demand for borrowing, and the overall resilience of the protocol's business model.

METRIC	EXAMPLE	INTERPRETATION
Utilization Rate	TVL — $10M, Borrowed — $8M → **80%**	70–90%—high capital efficiency, the protocol actively deploys liquidity .
	TVL — $10M, Borrowed — $5.5M → **55%**	40–70%—balanced state, capital is utilized efficiently while maintaining available liquidity .
	TVL — $10M, Borrowed — $3M → **30%**	<40%—low efficiency, may indicate weak demand or overly conservative capital management .

Table: Capital Utilization Assessment

Practical Rule of Thumb:

- **70–90%** → efficient capital utilization, high activity.
- **40–70%** → balanced level with available liquidity for growth.
- **Below 40%** → low capital efficiency, requires deeper analysis of underlying causes.

Staking Sector Project Evaluation Metrics

The staking/liquid staking sector plays a critical role in accumulating and efficiently distributing liquidity within the digital ecosystem. It enables users to earn yield from staking while maintaining asset liquidity, making these protocols attractive to both investors and passive market participants.

When conducting analysis, it's important to clearly define the perspective from which the evaluation is being made. Two primary viewpoints should be distinguished:

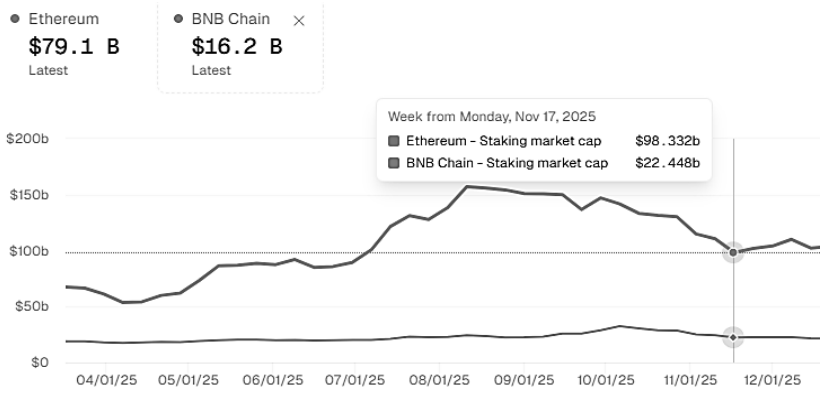
- **Investor** — evaluating the purchase of a staking protocol token
- **User** — planning to allocate assets into a staking protocol to generate passive income

In the first case, the key focus is on the total volume of assets deposited into the staking protocol, as well as the growth dynamics of those inflows.

- **Assets Staked (Total Value Staked, TVS)**

This metric reflects the total value of assets deposited by users into staking through liquid staking protocols.

It serves as a key indicator of user trust in the protocol and its ability to generate yield for participants. The higher the TVS, the more capital is actively deployed within the protocol.



Source: TVS Volume (Ethereum and Binance Chain) | **TokenTerminal**

In most cases, this signals a more stable business model and a higher probability of consistent, long-term returns for users.

- **Assets Staked Growth Rate**

This metric reflects how dynamically the volume of assets allocated to staking changes over a given period (typically monthly). It is calculated using the formula above.

$$\textbf{Growth Rate}(\%) = \frac{\text{End of Period} - \text{Beginning of Period}}{\text{Beginning of Period}} \text{ x } 100\%$$

Formula: Asset Growth Dynamics in Staking

It's important to focus on organic growth—excluding short-term incentives and seasonal spikes. This helps distinguish sustainable long-term protocol growth from temporary liquidity inflows.

METRIC	EXAMPLE	INTERPRETATION
Assets Staked Growth Rate	January: Start—$10M, End—$12.5M → **25%**	25%—aggressive growth (often driven by marketing campaigns or new integrations).
	February: Start—$12.5M, End —$13.75M → **15%**	10%—steady capital inflow.
	March: Start—$13.75M, End—$14M → **2%**	2%—baseline activity with no significant capital inflow.

Table: Assessment of Asset Inflow Growth into Staking Pools

Practical Rule of Thumb:

- **Above 20%** → aggressive growth, often driven by campaigns (e.g., airdrops) or new integrations.
- **5–20%** → stable capital inflow, indicating healthy user interest—especially during weaker market conditions.
- **0–5%** → baseline activity, may signal stability but also potential stagnation if sustained over time. Lack of growth over extended periods may indicate risk and should be benchmarked against competitors.

In the second case—when the goal is to identify a reliable staking protocol for passive income—the key metric becomes the Staking Ratio. A higher volume of staked assets reflects stronger user trust and deeper liquidity, which is particularly important for efficient position exits.

- **Staking Ratio**

This metric reflects the share of tokens that are currently staked or delegated within the network. It indicates what portion of token holders actively participates in maintaining network operations and indirectly reflects the network's stability and reliability.

A high staking ratio typically means that a significant number of participants are committed to the long-term development of the project and are willing to lock their assets to support the network. This enhances security by making potential attacks more difficult and reduces the amount of tokens available for speculative pressure in the market. In addition, strong staking participation often signals trust in the protocol and its economic model.

Conversely, a low staking ratio may indicate that token holders are not interested in long-term engagement or are focused on short-term market opportunities. This can lead to increased volatility, lower security, and higher centralization—especially if a large share of tokens is concentrated among a few participants.

The metric is calculated as the percentage of tokens that are staked or delegated relative to the total circulating supply. As such, it helps evaluate not only the current level of user participation but also the overall quality of token distribution and community involvement in supporting network infrastructure.

METRIC	EXAMPLE	INTERPRETATION
Staking Ratio	Total Supply — $10M, Staked Assets — $7,5M → **75%**	High ratio—committed community, strong security, and solid decentralization.
	Total Supply — $10M, Staked Assets — $5M → **50**%	Moderate ratio—balanced participation, average security, and decentralization.
	Total Supply — $10M, Staked Assets — $3M → **30**%	Low ratio—weak engagement, potential risks related to centralization and security.

Table: Calculation of the Staking Ratio Based on Delegated Assets

Practical Rule of Thumb:

— A higher staking ratio generally indicates a more committed community, stronger security, and better decentralization.

— A lower ratio may signal weaker holder engagement, potential centralization, and elevated network security risks.

- **Staking Yield (Annual Percentage Yield, APY)**

This metric reflects the annual return from staking a token and serves as a key indicator when evaluating an asset's attractiveness for passive income.
When analyzing APY, it's essential to consider the Real Reward Rate (RRR), which adjusts returns based on the protocol's current Inflation Rate. A high APY does not necessarily mean staking is profitable—especially if the protocol's economic model leads to sustained token inflation over time. In such cases, the real return for participants may be significantly lower than expected.

Using annualized APY helps smooth out seasonal yield fluctuations, assess average profitability, and incorporate inflation dynamics into the analysis. This provides a more accurate framework for long-term investment decisions and allows for a clearer view of real returns—or potential losses.

METRIC	EXAMPLE	INTERPRETATION
APY + Real Reward Rate	APY—6%, Inflation Rate—2% → **RRR = 4%**	Stable and moderate annual return after inflation adjustment.
	APY—12%, Inflation Rate—3% → **RRR = 9%**	Moderately risky yield that remains attractive after adjustment.
	APY—18%, Inflation Rate—5% → **RRR = 13%**	High-risk yield—real returns are significantly reduced due to protocol inflation.
	APY—10%, Inflation Rate—12% → **RRR = -2%**	Negative real return—despite a 10% APY, inflation outweighs rewards.

Table: Real Yield Calculation Adjusted for Inflation

Practical Rule of Thumb:

- **2–8%** → stable and moderate annual yield.
- **10–15%** → higher risk, often dependent on market conditions and seasonal dynamics.
- **Above 15%** → high-risk yield, frequently driven by aggressive incentive programs or short-term liquidity campaigns.

- **Exit Liquidity (Liquidity)**

A metric that reflects the available liquidity within staking protocols and determines how quickly—and with minimal loss—a user can exit a position. In traditional staking, assets are typically locked for a fixed period, whereas in liquid staking, derivative tokens (such as stETH in Lido or mSOL in Marinade) are used, which can be freely traded or deployed across DeFi protocols.

METRIC	EXAMPLE	INTERPRETATION
Liquidity	Lido (stETH): ≈ $3B in liquidity support across DEXs and major CEXs	High liquidity—positions can be exited easily, risks are minimal, and swaps are possible at almost any time.
	Marinade (mSOL): ≈ $700M in liquidity on DEXs, with some dependence on specific pools	Medium liquidity—exits are feasible but large trades may incur slippage.
	Newly launched protocol (Layer 1): liquidity pool ≈ $10M	Low liquidity—exits are constrained, significant losses may occur during swaps, posing higher risk for large investors.

Table: Liquidity Assessment and Exit Risks

Practical Rule of Thumb:

- High reserves → minimal risk and fast exit from staking.
- Medium reserves → acceptable risk level with active position management.
- Low reserves → elevated risk, best suited for smaller allocations.

Project Evaluation Metrics for the Infrastructure & Bridges Sector

When evaluating projects in this sector, primary focus should be placed on the stability of protocol usage and the volume of liquidity flowing through their infrastructure. These indicators help assess the project's level of integration, its role in facilitating liquidity movement across networks, and the degree of interaction with major ecosystems and key market participants that drive core capital flows.

- **Cross-Chain Volume (Transfer Volume)**

The total value of assets transferred between blockchains via a bridge or other cross-chain infrastructure service over a specific period (daily, weekly, monthly, or quarterly).

METRIC	EXAMPLE	INTERPRETATION
Cross-Chain / Transfer Volume	January: Transfer Volume: $100M, → **Stable volume**	Stable volume indicates normal protocol operations and service reliability.
	February: Transfer Volume: $700M, → **Sharp increase**	A sharp increase may signal a surge in activity (e.g., an airdrop or integration of a new protocol).
	March: Transfer Volume: $300M, → **Sharp decline**	A decline in volume may indicate technical issues, loss of user trust, or a temporary drop in activity.

Table: Cross-Chain Transfer Volume Assessment

Practical Rule of Thumb:

- Consistently high volumes typically reflect strong user trust and reliable infrastructure.
- Sharp spikes or drops may point to seasonal liquidity shifts, speculative activity, or technical limitations in handling large transaction volumes.
- Evaluation should be conducted over a period of at least one quarter.

- **Transaction Count**

A metric that reflects the number of confirmed transactions processed through the smart contracts of a bridge or other infrastructure service over a given period.

METRIC	EXAMPLE	INTERPRETATION
Transaction Count	January: Transaction Count: 1,200,000 Tx, → **Stable level**	A stable number of transactions indicates genuine usage of the protocol or solution.
	February: Transaction Count: 2,500,000 Tx, → **Sharp increase**	A significant rise in transaction count may point to seasonal drivers (e.g., an airdrop) or speculative activity.
	March: Transaction Count: 800,000 Tx, → **Sharp decline**	A drop in transaction count may indicate throughput limitations or declining user interest

Table: Transaction Count Assessment

Practical Rule of Thumb:

- A high and stable transaction count typically reflects consistent, real user engagement with the network.
- Sharp increases or declines may signal seasonal factors, speculative activity, or infrastructure throughput constraints.

- **Developer Activity**

A metric that reflects the level of developer engagement in maintaining and advancing a protocol. For bridges and infrastructure solutions, this metric is particularly critical, as these services handle significant volumes of assets daily, making them key points of risk within the ecosystem.

The development team plays a crucial role in maintaining protocol security, promptly identifying and mitigating vulnerabilities, and ensuring stable infrastructure performance.

METRIC	EXAMPLE	INTERPRETATION
Developer Activity	January: Commits: 450, → **Stable level**	A stable number of commits indicates ongoing development and consistent protocol maintenance.
	February: Commits: 700, → **Increasing activity**	Growth in commit count may signal the rollout of new features, major upgrades, or preparation for integrations.
	March: Commits: 150, → **Declining activity**	A potential risk signal—a drop in commits may indicate declining project momentum or reduced focus on updates and security .

Table: Developer Activity Assessment

Practical Rule of Thumb:

— A high level of developer activity indicates continuous project support, regular security updates, and ongoing feature improvements. This reduces the likelihood of technical failures and enables a rapid response to potential threats.

— Activity below the annual average suggests potential project stagnation, especially if the decline persists over time—this is a clear signal of elevated risk.

— Within large ecosystems, a temporary decrease in developer activity may be acceptable only after the completion of major milestones or strategic phases outlined in the project's roadmap.

Project Evaluation Metrics for the Real World Assets (RWA) Sector

When evaluating projects in this segment, it is advisable—already at the initial stage—to develop a basic understanding of their partnerships with major companies or global capital management players. This makes it possible to quickly identify which types of real-world assets the protocol is focused on.

Some projects may specialize in bond tokenization, others in real estate or commodities, while more advanced solutions span multiple asset classes simultaneously—such as bonds, real estate, equities, commodities, or private credit. This approach significantly simplifies the initial assessment, as it allows you to focus on large-scale partnerships and the real potential for asset tokenization.

If preliminary information is limited, the evaluation should begin with an analysis of the total volume of tokenized real-world assets within the protocol. After this initial overview and the application of key metrics, it becomes possible to form a deeper and more objective understanding of the current state and future outlook of this segment.

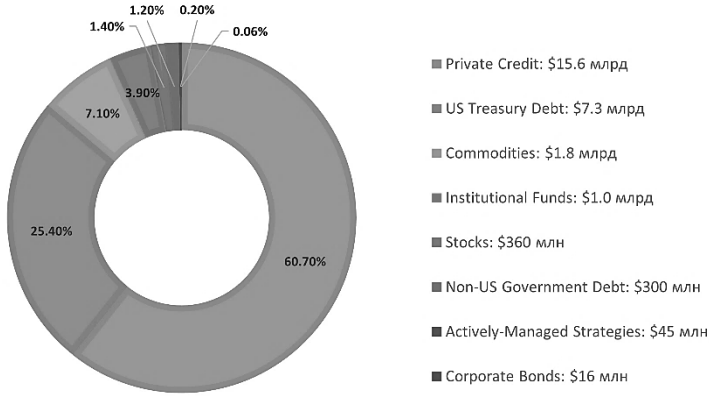
- **Total Market Size (Total RWA Value - Market)**

A metric that reflects the current structure of the entire tokenized real-world assets (RWA) market, including real estate, bonds, commodities, and other financial instruments. It represents the total value of already tokenized assets and helps assess the scale and current state of the RWA market.

At present, the majority of the tokenization market is concentrated in the Private Credit segment, indicating strong investor demand for this particular asset class.

At the same time, there is a gradual increase in interest in tokenized U.S. Treasury Debt. Demand for tokenized commodities and institutional funds (Commodities, Institutional Funds) is still in an active development phase and shows significant potential for future growth.

Meanwhile, tokenization of equities and non-U.S. government debt (Stocks, Non-US Government Debt) remains at an early stage, highlighting substantial upside potential in the future.



Source: RWA market distribution by asset classes | **RWA.xyz**

Some other real-world asset classes are also still in the early stages of adoption but maintain strong long-term development potential (Corporate Bonds).

Practical Rule of Thumb:

— Overall market growth is a positive signal of sector development and increasing investor confidence.

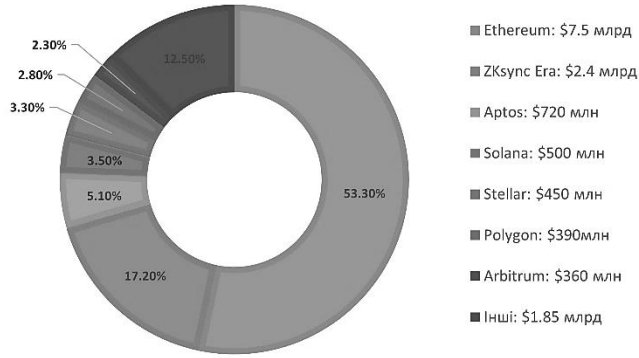
— A decline may indicate reduced interest in tokenization and is often associated with seasonal fluctuations or capital outflows.

It is also important to consider sector-level dynamics relative to each category's overall market share.

- **Total Value by Networks (Total RWA Value by Networks)**

This metric reflects the total value of tokenized real-world assets distributed across blockchain networks. It allows you to identify which networks lead in RWA volume, track growth or decline trends, and compare each network's share within the overall tokenized asset market.

After analyzing the total RWA market, it becomes important to focus on the blockchain networks most actively involved in tokenization. Currently, the majority of tokenized real-world assets are concentrated on the Ethereum network, confirming its dominant position. This reflects a high level of ecosystem maturity, a broad set of available tools, and the infrastructure capacity required to scale the RWA market.



Source: RWA market distribution by blockchain networks | **RWA.xyz**

The ZKsync network also demonstrates a strong position, reflecting growing user trust and active adoption of Layer 2 solutions. This highlights the practicality of its architecture and the availability of tools well-suited for real-world asset tokenization.

Other networks—Aptos, Solana, Stellar, Polygon, and Arbitrum—are currently in the early stages of RWA infrastructure utilization. This indicates a gradual expansion of the market beyond Ethereum and the emergence of a more diversified ecosystem, where new growth centers may develop over time.

It is also important to consider which networks leading market participants choose for asset tokenization, as this serves as an indicator of reliability, technological maturity, and future capital inflow potential.

Practical Rule of Thumb:

— Growth in an individual network's RWA share indicates increasing trust from issuers and users, greater infrastructure utilization, and a strengthening role within the tokenization ecosystem.

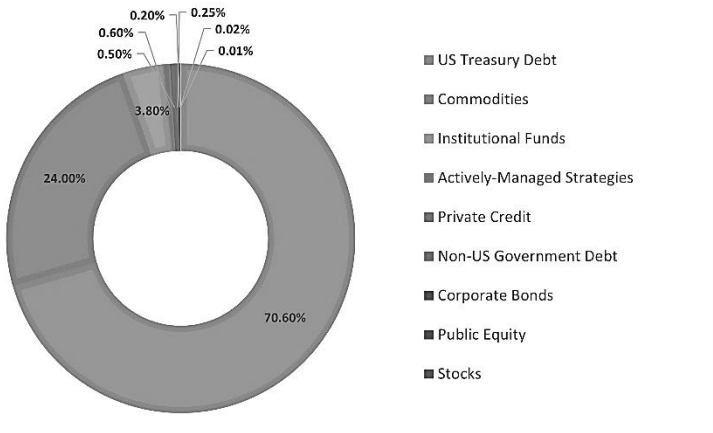
— A decline in share, conversely, suggests weakening network positioning, potential outflows of projects or capital toward competing blockchains, as well as technological or regulatory constraints that may limit future growth potential.

- **Asset Classes by Network (Asset Class by Network)**

This metric shows which classes of real-world assets are being tokenized within a specific blockchain network and in what volumes. It helps assess the level of diversification in tokenization, the network's development potential, and the risk of dependency on a single market or sector.

A deeper understanding of this metric enables a more comprehensive analysis of the structure of the entire tokenized economy. If one asset type dominates within a network (for example, real estate or debt instruments), it creates concentration risk—any issues in that sector could significantly impact the entire ecosystem. In contrast, broad representation of different asset classes—from real estate and commodities to financial instruments and receivables—indicates infrastructure maturity and its ability to adapt to market changes.

The importance of this metric also lies in its ability to reflect the real level of blockchain integration into the traditional economy. The greater the number and diversity of tokenized assets, the more the industry transitions from experimental use of the technology toward its practical application in global financial systems.

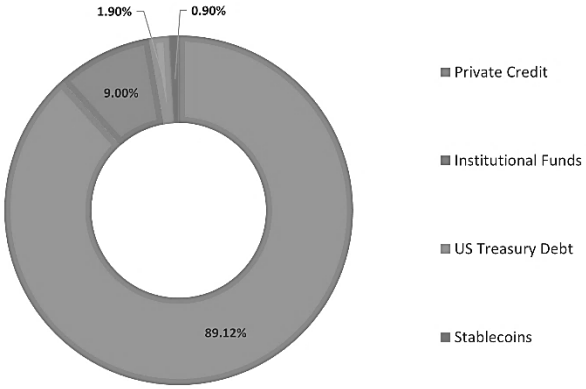


Source: Structure of tokenized assets on the Ethereum network | **RWA.xyz**

Analyzing the tokenization structure within the Ethereum network shows that the key asset classes are US Treasury Debt and Commodities. This

indicates a focus on stable, high-trust instruments. Institutional Funds are represented at lower volumes, while all other asset classes account for only a small share of the market and remain in early development stages.

In the ZKsync network, the dominant tokenized asset class is Private Credit, indicating a clear focus on this segment. Institutional Funds also play a significant role, while US Treasury Debt and Stablecoins are represented at lower volumes. This structure reflects an orientation toward financial and investment products with moderate risk and potentially higher returns.



Source: Structure of tokenized assets on the ZKsync network | **RWA.xyz**

After a general overview of blockchain networks involved in RWA tokenization, a deeper analysis of each network helps identify its strategic focus: which asset classes it specializes in, how diversified its tokenization structure is, and which segments have the highest growth potential.

Comparing different networks in this context highlights differences in their approaches: some focus on stable and institutional-grade assets, forming the foundational infrastructure of the market, while others target more niche or dynamic segments with higher risk and potentially higher returns. Collectively, these differences do not indicate competition but rather the formation of a complementary ecosystem, where different networks serve different needs of participants in the tokenized real-world assets market.

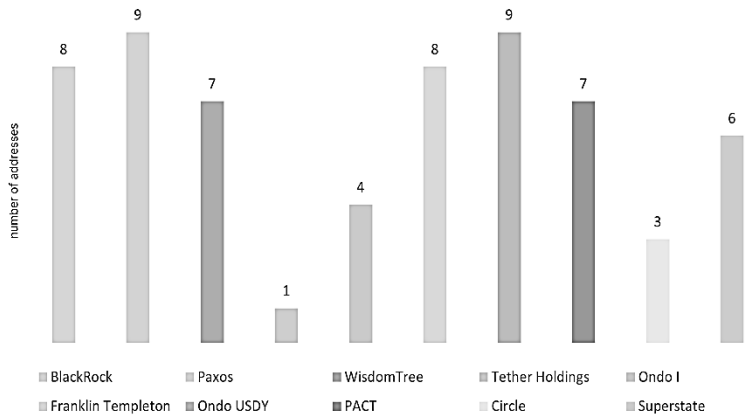
Practical Rule of Thumb:

- The dominant asset class reflects the primary focus and strategic direction of the network
- Medium-volume classes indicate segments with growth and diversification potential.
- Low-volume classes are typically emerging areas still in early stages of development.

Ultimately, analyzing the structure of tokenized assets helps not only evaluate the current state of a network but also understand its long-term resilience, development direction, and ability to withstand market volatility.

- **Asset Issuers**

This metric reflects the number of companies or funds engaged in real-world asset tokenization, as well as the number of unique addresses that hold or service these tokens. Analyzing it both at the overall market level and across individual blockchain networks helps identify key participants in the ecosystem, understand their specialization by asset class, and determine their choice of infrastructure for product deployment.



Source: Tokenized asset issuers | **RWA.xyz**

A deeper examination of leading entities under this metric also helps reveal the most active market segments and the strategic approaches of issuers—

specifically whether they focus on building within a single network or adopt a multi-chain strategy to reduce risk and expand liquidity access.

For example, let us consider the company Paxos. Based on the available data, we can observe the number of issuing companies as well as the number of unique addresses across different blockchain networks involved in the tokenization process. This provides a foundation for further detailed analysis of each company based on the following key aspects:

- which networks are being used
- which asset classes are being tokenized
- the level of diversification.

ASSET NAME	ASSET CLASS	NETWORK	NETWORK CONTRACT ADDRESSES
PayPal USD	Stablecoins	Ethereum, Solana	2 Addresses
Paxos Gold	Commodities	Ethereum	0x458…cbAf78
Global Dollar	Stablecoins	Ethereum, Solana	2 Addresses
Pax Dollar	Stablecoins	Ethereum, Solana	2 Addresses
Binance USD	Stablecoins	Ethereum	0x4fa…3c7c53
Lift Dollar	Stablecoins	Ethereum	0xbdc…5adbcd

Table: Detailed analysis of the issuer company Paxos | **RWA.xyz**

According to the available data, Paxos is focused on tokenizing two asset classes: stablecoins and commodities. Tokenization is carried out on two networks—Ethereum and Solana. The total number of unique smart contract addresses is nine. Additionally, the dataset provides a list of digital products created by the company, offering insight into the scale and structure of its operations.

Practical Rule of Thumb:

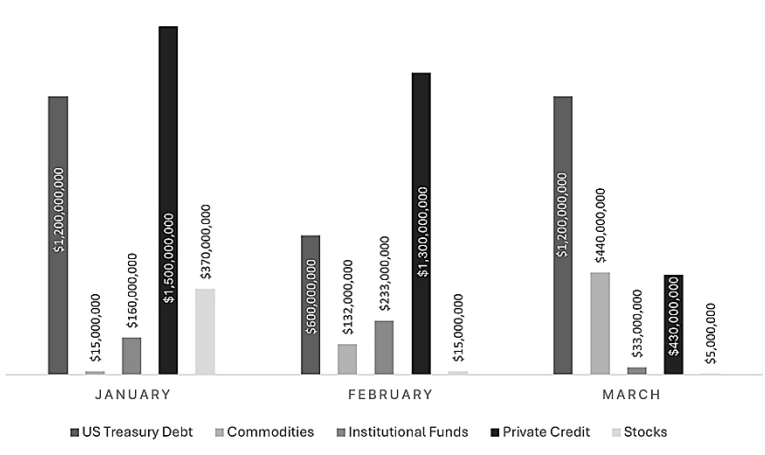
When analyzing an issuer, it is important to systematically identify which asset classes it tokenizes, which blockchain networks it uses, the number of unique addresses, and the number of products it has issued.

- **Issuance Volume**

This metric reflects the total amount of new assets tokenized by a protocol over a given period. It is not merely a numerical indicator but a reflection of market activity and a signal of demand for real-world asset tokenization.

The largest contribution to overall issuance volume comes from US Treasury Debt and Private Credit. Government bonds showed peak volumes in January and March, with a temporary decline in February. Private Credit grew in January–February, while momentum slightly slowed in March.

Below are the data on tokenized issuance volumes for the first three months of 2025.



Source: Tokenization issuance volume by asset classes | **RWA.xyz**

Other asset classes—Commodities, Stocks, and Institutional Funds—showed moderate issuance volumes, indicating cautious interest and significant potential for further growth. This dynamic may suggest that these segments are still in the early stages of market formation, where participants are actively assessing risks and the efficiency of available instruments.

If demand stabilizes, these categories may become new growth drivers in the medium- to long-term horizon.

Practical Rule of Thumb:

— The main market drivers are assets with consistent issuance growth, as they indicate the direction of demand.

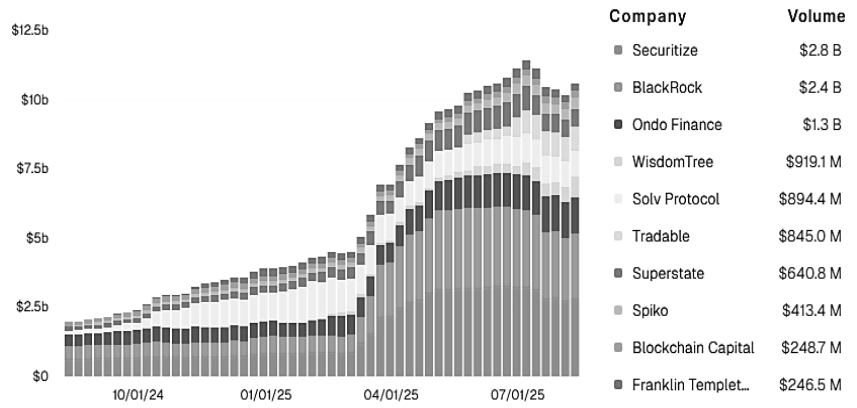
— Moderate volumes should not be ignored, as they may represent early-stage opportunities for future expansion.

— The distribution of issuance across asset classes helps assess market stability and its sensitivity to seasonal fluctuations.

Capital Deployed

This metric shows how user funds are allocated across tokenized assets through various management platforms. Essentially, it represents investor deposits seeking yield, as well as an indicator of trust in infrastructure and demand for specific asset classes.

Data over the past 365 days reflects the dynamics of capital inflows into tokenized assets. It allows tracking how volumes have evolved throughout the year and which projects have emerged as leaders in terms of deployed capital. This signals investor confidence and the strong positioning of leading platforms within the market.



Source: Capital allocation across management platforms | **RWA.xyz**

It is also important to note that capital growth dynamics tend to be cyclical: inflows follow a wave-like pattern, with seasonal fluctuations and concentration of resources in a limited number of leading platforms that drive the overall development of the sector.

Practical Rule of Thumb:

- Capital inflow trends over the year should be monitored, with a focus on identifying leading platforms and analyzing their volumes.
- High levels of deployed capital indicate investor confidence and platform stability.
- Wave-like dynamics point to seasonality and the emergence of broader market trends.

Assessment of Potential Risks

When analyzing crypto and blockchain projects, it is essential to consider the core risk categories that can significantly impact platform stability, security, and long-term development. Based on practical experience, four primary risk groups stand out as the most common and most critical for the entire industry.

- **Technological Risks**

These include coding errors, security vulnerabilities, and potential exploits. They can lead to loss of user funds, protocol disruptions, and substantial financial damage to the platform. High hacker activity and weak internal security significantly increase exposure to these risks, and no project can be considered fully immune.

- **Regulatory Risks**

These are associated with potential bans, restrictions, or new regulatory requirements across different jurisdictions. Such changes may limit platform functionality or restrict user access to certain services. At an early stage, it is important to evaluate the project's jurisdiction to understand potential regulatory constraints and assess long-term stability. While not

all conflicts can be predicted, and their impact can be mitigated through proper compliance with regulatory standards.

- **Market Risks**

These arise from shifts in investor sentiment, the emergence of new competitors, or macroeconomic fluctuations. They directly affect token demand, user activity, and price volatility. From a practical standpoint, macroeconomic conditions are often the most powerful driver—despite control over other factors, they can still significantly influence project performance.

- **Team and Leadership Risks**

These are driven by the human factor. The departure of key team members or internal conflicts may result in development delays, poor decision-making, or a loss of strategic direction. These risks are often underestimated, yet even the loss of a single critical contributor can slow down development and call the platform's long-term viability into question.

Systematic Monitoring

The digital asset market is extremely dynamic. Every day, new partnerships, integrations, roadmap updates, and shifts in project strategies emerge. Without continuous tracking of key events, it is easy to lose context and miss critical signals that influence asset valuation and long-term prospects.

The quality of any evaluation directly depends on the quality of its information sources. News aggregators, social media platforms, and influencers may seem convenient, but in most cases they represent informational "fast food," designed for quick consumption rather than deep analysis. Over time, as experience accumulates, you naturally build a trusted set of sources and learn to effectively filter out informational noise. At the same time, an excessive volume of data without a clear selection framework can reduce decision quality, which is why it is essential not only to collect information but also to structure it according to your own strategy.

Proprietary monitoring methodologies allow you to see not just isolated events but the broader market structure and its individual niches. Once a project is added to a portfolio, the focus shifts: you are no longer simply observing the development of an idea but actively searching for signals that may impact risk or future profitability. Special attention should be given to trigger events—such as large token unlocks, changes in tokenomics, legal rulings, or significant institutional investments. This is similar to climbing a mountain, where it is not enough to know the destination you must also be prepared for the route, weather conditions, and your own limitations in order to reach the goal safely.

Market assessment should begin with research and reports from leading digital asset management firms. Such materials are produced by experienced analysts with access to a broad range of tools, providing a more balanced and systematic perspective. It is useful to regularly study reports from companies managing crypto ETFs and ETPs, such as BlackRock, Grayscale, or CoinShares, and to complement this analysis with data from mining companies like Riot, MARA, or IREN. This helps build a comprehensive view of the ecosystem.

Key metrics to monitor include the number of active addresses, transaction volumes, TVL (Total Value Locked), token issuance dynamics, liquidity, and ownership structure. For systematic monitoring, it is advisable to use specialized analytics platforms, on-chain tools, and data aggregators.

At first, this type of information may seem complex, but with practice, its interpretation becomes clearer and more effective. Broad market reviews should be conducted monthly in order to timely identify trend shifts and seasonal fluctuations.

In parallel, individual projects and their ecosystems should be monitored. This includes evaluating performance, updating fundamental indicators, and tracking market developments such as investments, token unlocks, partnerships, or integrations. Such analysis is typically performed over a monthly horizon, with updates weekly or biweekly. It is also important to document findings in the form of short summaries or a

monitoring journal—this helps track changes over time and improves the quality of future decisions.

Prices and trading volumes of portfolio assets require daily attention. Roadmap updates, code changes, and reporting are logically reviewed on a weekly or monthly basis, while also accounting for the emergence of new competitors, regulatory changes, and macroeconomic factors. For blockchain networks as the foundation of the ecosystem, the monitoring period should be extended to monthly or quarterly intervals to support more strategically sound decision-making.

The optimal monitoring frequency includes a yearly or quarterly horizon for evaluating ecosystems and blockchain networks, a monthly or weekly interval for project-level analysis and performance dynamics, and a multi-day interval for tracking token prices and trading volumes.

Systematic monitoring allows you to stay close to the market and make informed decisions at a time when most participants react too late. Consistent work with high-quality sources, fundamental and market metrics, and flexible adjustment of monitoring frequency depending on an asset's role in the portfolio form the foundation of long-term resilience and effective risk management.

Part V: Tokenomics

Tokenomics—a term combining "token" and "economics"—is the fundamental foundation of any cryptocurrency project. It is not merely a description of a digital asset's financial characteristics but a comprehensive system of rules and mechanisms that defines how a token is created, distributed, and used and how its long-term value is formed. Tokenomics should be viewed as the business model of a company, where every element is pre-programmed and serves a specific purpose.

For early-stage investors, understanding this concept marks an important stage of development—a gradual shift from viewing cryptocurrencies as a game of chance to analyzing them as fully functioning economic systems. A solid grasp of tokenomics enables investors to evaluate a project's long-term sustainability rather than simply reacting to short-term hype. It reveals the ownership structure of an asset and shows how incentives are distributed among the development team, early investors, and the community, allowing one to assess whether stakeholder interests are aligned and whether the ecosystem maintains internal balance. It is also essential to analyze the token's lifecycle—from issuance and unlock schedules to burn mechanisms or demand incentives.

Poorly designed tokenomics—for example, with excessive inflation or a high level of centralization—can destroy a project regardless of its technological advantages. In such cases, even a strong product may fail under economic pressure. This is why tokenomics analysis is one of the core tools of rational investing and a fundamental requirement for making well-informed decisions. Additionally, it is important to consider mechanisms that support token demand, such as utility functions, governance participation, or access to ecosystem services.

At this stage, the perspective itself changes. Once cryptocurrencies are viewed as economic systems rather than speculative instruments, tokenomics becomes the first anchor point of analysis. It shows how a project creates value, how that value is distributed, and what incentives are

embedded for users, investors, and the team. To properly interpret this system, one must start with its basic components.

Core Concepts of Tokenomics

The type of token directly defines a project's economic model. If a token has a utility nature, tokenomics will focus on incentivizing its usage within the ecosystem. If the token serves a governance function, the model will encourage long-term holding and active participation in decision-making. Therefore, the first step in analyzing tokenomics is understanding the role of the token. In practice, the following types are widely used:

Utility Tokens—act as the "fuel" of the ecosystem and provide access to the project's products or services. The more actively the network is used, the higher the demand for the token becomes, meaning the economic model is directly tied to real product usage.

Governance Tokens—grant holders voting rights on protocol changes, resource allocation, or strategic upgrades. This model is typically oriented toward long-term holding or staking, as a user's influence depends on the number of tokens they hold.

Investment Tokens—may provide rights to real-world assets or a share of project revenues. Their tokenomics is often designed with regulatory compliance in mind, making them more attractive to institutional investors but also limiting model flexibility.

Dual-Token Models (Dual Tokens)—commonly used in GameFi and complex ecosystems. In such systems, functions are split between two tokens. For example, in the Axie Infinity ecosystem, the AXS token is used for governance and staking, while SLP serves as an in-game currency. This approach reduces pressure on the primary token and clearly separates economic roles.

Stablecoins occupy a special place in tokenomics. They are pegged to stable assets, most commonly the US dollar, and are designed to minimize volatility. These tokens primarily serve as a store of value and a means of settlement rather than investment growth instruments.

The next step is understanding the core terminology that serves as the foundation for studying tokenomics and the structural design of crypto projects.

Total Supply—the maximum number of tokens that can exist within the network.

Circulating Supply—the number of tokens currently in the market and available for trading.

Locked Supply—tokens that are temporarily restricted from circulation to prevent excessive price pressure or inflation, especially during periods of market instability.

Unallocated Supply—tokens with no defined distribution schedule yet, which may only enter circulation once specific conditions are met.

Unlocked Supply—tokens that are eligible to enter circulation but have not yet reached end-user wallets, meaning they do not always match circulating supply.

Available Supply—tokens that may potentially enter the market directly or after certain conditions are met, representing an important factor in assessing future selling pressure.

Untracked Supply—arises due to missing or unclear data regarding a portion of tokens.

Emission—the process of introducing tokens into circulation according to tokenomics rules. It typically defines the volume of tokens released and the timeframe over which they are unlocked based on a predefined schedule.

Allocation and Distribution Structure

In simple terms, token allocation refers to the distribution of the total token supply among different stakeholders within a crypto project. It shows who holds economic control over the asset, how influence is distributed, and which priorities are embedded in the project's development model. Allocation is one of the key elements of tokenomics because it provides a complete picture of the project: who owns the tokens, which groups can

influence decision-making and how the potential for growth or risk is formed.

In practice, each project may have its own allocation structure. The number of categories, their naming conventions, and level of detail often vary depending on the team's vision and how the model is described in the whitepaper. At the same time, groups with identical functions are often labeled differently, which complicates analysis and may create unnecessary confusion for investors.

To simplify understanding and provide a universal evaluation framework, a standard approach to allocation breakdown is presented below, highlighting key structural categories and explaining their roles. The examples include common allocation labels frequently found across different projects. Despite differences in terminology, their functions and objectives remain similar according to general tokenomics principles.

This approach helps investors navigate any project's structure more easily, even if its allocation system is described in complex or unconventional language, and enables faster assessment of the balance between ecosystem participants. In particular, it helps identify excessive token concentration within specific groups and potential centralization risks.

- **Founder & Team allocation**

Covers tokens allocated to individuals responsible for building, developing, and maintaining the long-term growth of the project. This includes founders, core team members, key developers, advisors, and future employees involved in strategic management and technical execution.

Functional purpose: This allocation combines short-term rewards for contributions to the project with long-term incentives through gradual token unlocks according to a vesting schedule.

Analytical value: Unlocks may occur daily, monthly, or quarterly, often preceded by a cliff period. This structure reduces sudden selling pressure and increases investor confidence. Transparent, long-term vesting signals a mature tokenomics design, demonstrating the team's commitment to ecosystem development rather than short-term profit realization. This

allocation also helps assess alignment between developers, users, and investors, as well as potential concentration risks.

Documentation markers: Founder, Team, Core contributor and Future employees.

- **Private Investors allocation**

Allocated to venture funds and private investors who finance the project at early stages. This capital enables product launch, team formation, and initial infrastructure development.

Functional purpose: Private investors typically receive tokens at a lower price compared to public offerings to compensate for higher early-stage risk. However, these tokens are almost always subject to long lock-up periods (cliffs), followed by gradual vesting, usually over 2–4 years. This creates long-term alignment between investors and the project's strategic development.

Analytical value: This allocation helps assess token concentration among funds and potential selling pressure during future unlock events. It is a key indicator of balance between private capital, the team, and public markets, and may also signal the level of institutional confidence in the project.

Documentation markers: Strategic Round, Private Sale, Series A, Series B, Angel Investors, Venture Capital.

- **Public Investors Allocation**

Comprises tokens distributed through open sales channels to a broad range of participants. Unlike private rounds, this allocation typically does not include long vesting periods, meaning tokens become tradable immediately after sale or listing.

Functional purpose: The main goal of public allocation is to raise additional capital for project development and to build an active user community. Open sales increase project visibility, ensure broader token distribution, and create initial secondary market liquidity.

Analytical value: It is important to evaluate how many tokens enter circulation immediately. A disproportionately large public allocation without stabilization mechanisms may lead to increased short-term

volatility. A balanced structure, on the other hand, supports market stability and long-term community engagement.

Documentation markers: Whitelist, IDO, ICO, ILO, IEO, Crowdsale, Launchpad, CoinList.

- **Reserved allocation**

Includes tokens set aside for future recipients not defined at the project's launch. This reserve is typically controlled by the company, DAO, or a dedicated foundation and is used strategically throughout the project lifecycle.

Functional purpose: Reserved allocation serves as a tool for long-term development and operational stability. It is used to fund product expansion, new feature launches, infrastructure maintenance, marketing initiatives, and unforeseen expenses. It is often labeled as ecosystem allocation and used for developer grants, strategic partnerships, and ecosystem incentives.

Analytical value: The key factor is transparency in reserve management. A large reserve without clear usage rules creates centralization risks and potential market influence. In contrast, formalized governance mechanisms—especially DAO-based decision-making—are a positive indicator of mature tokenomics and sustainable ecosystem development.

Documentation markers: Foundation, Treasury, Endowment, Ecosystem, Marketing, Non-profit Foundation, Strategic Reserves.

- **Community allocation**

Includes tokens dedicated to incentivizing user participation and ecosystem growth. This allocation plays a critical role in building an active and loyal community that not only uses the product but also contributes to its testing, development, and adoption.

Functional purpose: Tokens are used to reward early users, incentivize staking, support testnet participation, liquidity programs, and other forms of active engagement. This aligns incentives between the project and its users, strengthening network effects.

Analytical value: When evaluating this allocation, it is important to consider the scale, duration, and structure of reward programs. Overly aggressive incentives may create short-term price pressure, while a balanced approach supports organic growth, user retention, and long-term ecosystem stability.

Documentation markers: Airdrop, Liquidity Mining, Staking Rewards, Bounty Program, Contest, Initial LP.

- **Other Allocations**

Covers specialized token distribution categories that fall outside the core allocation types and are defined individually depending on the project's needs. Their purpose is typically described in detail in the whitepaper or technical documentation.

Functional purpose: This category may include tokens for liquidity provision on DEXs and CEXs, licensing models, donations, strategic partnerships, or other non-standard use cases. Such allocations improve operational flexibility, help reduce price volatility during large transactions, and support market stability.

Analytical value: It is important to assess how clearly these tokens are governed and how transparent their usage rules are. Vague or overly broad definitions may hide potential risks of additional market pressure.

Documentation markers: Liquidity (DEX/CEX), Licensing, Donations, Special Purpose Allocation.

Now it is important to become familiar with the typical percentage distribution of tokens within a crypto project. These standard ratios form a baseline understanding of a healthy and balanced allocation structure. They help investors quickly orient themselves during the initial project evaluation and determine whether a project's tokenomics aligns with generally accepted market standards and practices.

The data presented for 2022–2024 reflects the average token distribution in projects launched during this period. This statistic provides insight into real industry practices and allows comparison with standard allocation models. Such analysis helps identify which tokenomic

approaches dominated in recent years and whether a specific project aligns with these trends or deliberately deviates from them.

This analysis helps understand which approaches have been dominant in token economies over recent years and how closely a given project follows these trends or intentionally diverges from them.

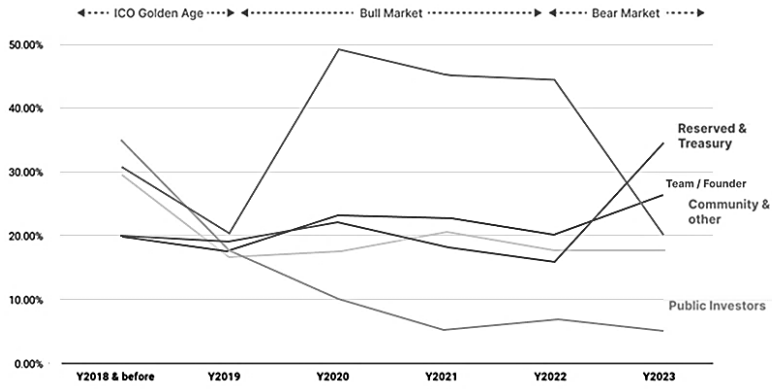
ALLOCATION GROUP	STANDARD RANGE	AVERAGE PROJECT ALLOCATION (%)
Founder & Team	15-25%	20%
Private Investors	5-25%	16.1%
Public Investors	5-10%	4.6%
Community	35-45%	37%
Reserved	15-25%	22.3%
Other	5-10%	-

Table: Statistical Token Allocation Distribution in Projects (2022–2025) | **Tokenomist**

Founders and the team typically receive 15–25% of the total token supply, averaging around 20%. The share allocated to early investors varies more widely—from 5% to 25%, with an average of approximately 16%. Public investors usually account for a smaller portion—around 5–10%, with an average of about 4.6%.

The largest portion of tokens in most projects is allocated to the community—on average around 37%, reflecting a focus on ecosystem development and long-term incentives. The reserved allocation typically ranges from 15 to 25%, while other auxiliary categories account for approximately 5-10%, depending on project specifics.

It is interesting to note that in most cases, reserves were positioned toward the upper end of the range, while community allocations were reduced. In the context of the market, this reflects the conditions of limited liquidity and challenging market environments that emerged in 2022.



Source: Capital allocation distribution across management platforms | **Tokenomist**

This indicates a shift toward a more conservative strategy: teams aimed to build additional reserves to ensure project sustainability, cover operational costs, and maintain stability in order to achieve long-term goals in an unfavorable environment.

In contrast, during bull markets, the strategy takes a different form. As observed in periods of strong growth, most teams prioritize community expansion. As a result, a larger share of tokens is allocated to staking, liquidity provision, and airdrops, which stimulate user activity and expand the ecosystem. This approach builds trust and community loyalty, keeping users engaged within the project and strengthening long-term support.

From a personal analytical perspective, when evaluating new projects, it is essential to pay attention to the structure and grouping of token allocations. In practice, this allows for a quick identification of key token holders, an assessment of distribution balance, and an understanding of whether the team is laying the foundation for long-term project development.

When analyzing token allocation, the first step is to assess the overall quality of the tokenomics structure.

- **Healthy Tokenomics Model**

A significant portion of tokens—often more than 50%—is allocated to the community. This approach ensures broad token distribution, strengthens decentralization, and reduces the risk of market manipulation. Another strong signal is the presence of clear and long-term vesting schedules for the team and early investors, which reflects accountability from the development team and a commitment to the project's long-term growth.

Equally important is a balanced allocation across all categories, without excessive concentration in a single group. This creates a more resilient economic model and reduces dependency on any single stakeholder, making the ecosystem more stable over time.

- **Risky Tokenomics Model**

One of the primary red flags is an imbalanced allocation where the team and advisors control more than half of the total token supply. Such a structure often signals high centralization and a potential risk of market pressure from insider holdings.

Another concerning indicator is a low community allocation. If users are assigned less than 30% of the total supply, their incentive to actively participate in and support the ecosystem significantly decreases, which can weaken long-term growth dynamics.

The size of the treasury or reserve allocation is also critical. When less than 20% is dedicated to ecosystem development, it limits the project's ability to fund infrastructure, marketing, and future expansion.

An additional risk factor is the absence of transparent vesting schedules or overly short unlock periods. This can lead to sudden supply shocks and increased volatility due to large-scale token releases entering the market at once.

In summary, the token allocation structure is one of the key indicators of decentralization and the overall "health" of a project. For investors, it serves as a signal of whether the team is building a sustainable long-term

economic model and ecosystem—or focusing primarily on short-term value extraction.

Vesting and Token Unlock Mechanics

Ha In the previous section, we examined how tokens are distributed among different participant groups. However, it is important to understand that this allocation does not imply immediate access to all assets. In most projects, a significant portion of tokens is initially locked, and full ownership rights are granted gradually over time. This process is implemented through a dedicated mechanism called **vesting**, which defines the schedule and pace of token unlocks for each category of participants. Vesting plays a critical role in balancing the interests of the team, investors, and community, while also reducing the risk of sudden market pressure.

Vesting is a mechanism in which tokens allocated to specific parties (such as the team, investors, advisors, etc.) are not released immediately but instead are gradually unlocked over a predefined period according to a predetermined schedule. The primary purpose of vesting is to maintain economic stability within the project, prevent sharp price fluctuations, and incentivize long-term commitment from all participants.

Cliff Period—an initial "waiting period" during which tokens remain fully locked. Only after this phase ends does the unlocking process begin.

Cliff Unlock—the first one-time release of tokens after the cliff period ends. It typically involves unlocking a portion of the allocation (for example, 10–25%) and serves as the starting point of the vesting schedule.

Linear Unlocking—the next stage, during which tokens are released in equal portions at regular intervals. Unlocks may occur daily, weekly, monthly, or quarterly. This approach ensures predictability in token supply and reduces the risk of sudden market pressure.

In some projects, the unlock schedule may be adjusted by the team itself or through DAO governance mechanisms. In such cases, vesting can take not

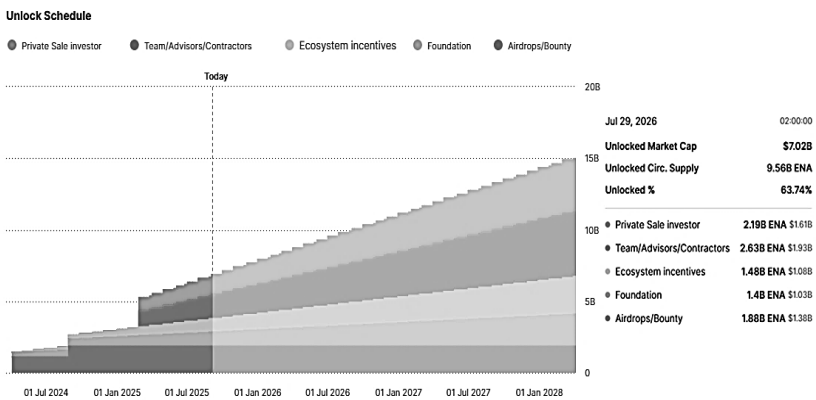
only a linear form but also an adaptive or variable structure, allowing it to respond to market conditions and the state of the ecosystem.

Unlock Schedule—a predefined plan that outlines when, how frequently, and in what amounts tokens become available to different participant groups. It reflects the time-based distribution of tokens, including cliff periods and gradual vesting stages, and allows for the assessment of potential market pressure and price volatility risks.

In practice, an unlock schedule typically works as follows: investor agreements often include a cliff period, for example, 12 months. During this time, neither investors nor the team have access to their tokens, meaning they cannot sell them. After the cliff period ends, an initial portion of tokens (for example, 25%) is unlocked at once, while the remaining tokens are gradually released through a linear schedule over a defined period.

Additionally, vesting not only restricts token access over time but also serves as a mechanism for aligning incentives among all project participants. Clearly defined unlock conditions increase supply predictability, reduce speculative pressure, and allow investors to evaluate the potential impact of future emissions on price and liquidity. Conversely, a lack of transparent vesting or overly short vesting periods may signal elevated risk and a weak long-term commitment from the team.

Below is a typical example of a standard token unlocking schedule.



Source: Tokens unlock schedule of the project | **Tokenomist**

In the diagram, different participant groups are highlighted by colors, making their allocation shares immediately visible. The line chart illustrates the start of token unlocking after the cliff period (June 1, 2024) and the gradual distribution of tokens over the 2024–2028 period. In addition, users can select any date to see what portion of tokens has already been unlocked, as well as how they are distributed among participant groups at a specific point in time.

Token unlocking can occur daily, weekly, or monthly in equal installments and may last from one to four years or more. This approach allows for a smooth distribution of token supply over time and reduces the impact of large individual unlock events on market dynamics.

The unlock schedule serves several key functions:

— It prevents a simultaneous release of many tokens onto the market, which could sharply depress the price.

— It ensures long-term alignment of incentives for the team and investors, as their potential returns are directly tied to the future growth of the token's value.

The table below shows the average vesting duration for different participant groups in projects launched between 2022 and 2023. As can be seen, a significant portion of team and early investor tokens is gradually unlocked over a period of up to four years.

ALLOCATION GROUP	AVERAGE VESTING PERIOD IN PROJECTS (YEARS)
Founder & Team	3.99
Private Investors	3.95
Public Investors	0.33
Community	2.50
Reserved	2.44
Other	-

Source: Average vesting period unlocks of the project | **Tokenomist**

This reflects most of the projects' orientation toward long-term development.

Community and reserve tokens are typically locked for periods exceeding two years, which demonstrates projects' intention to maintain an active user base and pre-allocate resources for ecosystem incentives even during cyclical market downturns. Additionally, this structure allows teams to respond flexibly to changes in market conditions without making abrupt structural adjustments to tokenomics

Interpretation of Tokenomics Models

Now we move to the question of how to properly use the unlock schedule. On its own, an **unlock schedule** is simply a visualization of when and how tokens enter circulation. Its real value emerges only when we know how to interpret this data correctly. Below, based on practical experience, we examine the logic of evaluating different unlock structures and vesting periods. By analyzing an unlock schedule, investors can gain meaningful insights into a project's strategy, potential risks, and long-term ecosystem design.

- **Unlock Schedule**

Defines the rules and pace at which tokens enter circulation over time. It is one of the core mechanisms of tokenomics, directly influencing market dynamics and participant behavior. Additionally, it shapes market expectations regarding future supply, which has a direct impact on liquidity conditions and overall volatility.

Functional purpose: The unlock schedule controls token supply in the market, reducing the risk of sudden liquidity shocks, while also creating long-term incentives for the team, investors, and the community.

Types of unlock schedules:

- **Linear vesting:** tokens are released in equal portions throughout the entire vesting period. This model creates predictable supply dynamics and reduces the risk of sharp price fluctuations.

- **Non-linear vesting:** token release is uneven, often structured as large one-time unlocks. This can create sudden selling pressure and higher volatility, especially in low-liquidity conditions.

Analytical value: Analyzing unlock events allows investors to anticipate potential risks in advance. It is important to track key unlock dates and compare released volumes to the project's market capitalization. Price fluctuations are often observed several days or weeks before and after unlocking events—ranging from short-term dips due to profit-taking to speculative price spikes. Evaluating unlock volume in USD terms helps more accurately forecast volatility and adjust investment strategy in a timely manner.

- **Cliff Duration**

The cliff acts as a protective mechanism in tokenomics, defining an initial full lock-up period before any gradual vesting begins.

Functional purpose:

- **For the team:** encourages long-term commitment rather than short-term profit-taking
- **For investors**: ensures early-stage participants cannot immediately exit after token listing
- **For the market**: reduces the risk of large token dumps during volatile periods, supporting relative price stability.

Analytical value: A longer cliff period increases investor and user confidence and signals a project's long-term orientation and economic stability.

Optimal range: Typically 12–18 months. The absence of a cliff or a full 100% unlock at launch significantly increases short-term market risk.

- **Cliff Unlock**

Defines the first tranche of tokens available to the team or investors after the cliff period ends.

Functional purpose:

- Provides initial access to tokens after the lock-up period ends
- Allows the market to gradually absorb new supply.

Analytical value: The initial unlock typically represents a significant portion of the allocation (10–25%), allowing investors to evaluate participant behavior and potential market impact. Excessively large unlocks at this stage can create short-term selling pressure.

Optimal range: 10–25% of total allocation released once, immediately after the cliff ends.

- **Linear Unlock**

Represents a steady release of tokens into circulation after the cliff period, distributed evenly over time.

Functional purpose:

- Provides Ensures predictable token flow into the market, reducing volatility
- Aligns incentives by encouraging long-term participation from teams and investors**.**

Analytical value: Shows how token allocation is distributed over time after the initial cliff unlock, helping assess long-term supply pressure and incentive alignment.

Optimal range: 1–4 years, with release intervals that may be daily, weekly, monthly, or quarterly.

- **Total Vesting Duration**

Represents the full period over which tokens are gradually unlocked after the cliff phase.

Functional purpose:

- Controls token supply entering the market and reduces sharp price fluctuations.

- Incentivizes long-term engagement from the team, investors, and community.

Analytical value:

- Vesting shorter than 12 months increases the risk of rapid token release and reduces investor confidence
- Vesting longer than 60 months may weaken team motivation and slow down ecosystem development.

Shows how token allocation is distributed over time after the initial cliff unlock, helping assess long-term supply pressure and incentive alignment.

Optimal range: 24–48 months.

- **Unlock Progress**

Shows what portion of the total token supply has already entered circulation and how far the vesting process has progressed. It helps assess the potential impact on price and liquidity under different market conditions.

Unlocked: 0 - 10%

- **Bear market (weak cycle):** most tokens remain locked. There is a high probability of selling pressure during future large-scale unlock events.
- **Bull market (strong cycle):** stability is still not established the ecosystem is in an early development stage.

Unlocked: 25 - 50%

- **Bear market (weak cycle):** a portion of tokens is already circulating, creating moderate downward pressure on price. The market is gradually adapting, but short-term volatility risks remain around large unlock events.
- **Bull market (strong cycle):** unlocked tokens support liquidity and user activity. Volatility risk is lower, and unlocks can contribute to organic price growth.

Unlocked: 50-80%

- **Bear market (weak cycle):** a significant share of tokens is already in circulation, but residual supply pressure still exists. Price may fluctuate during major unlock events.
- **Bull market (strong cycle):** token availability supports liquidity and ecosystem activity, fostering growth. Volatility risk is moderate.

Unlocked: 100%

- **Bear market (weak cycle):** vesting is fully completed, and there is no additional unlock-driven pressure. Project valuation is primarily based on fundamental metrics.
- **Bull market (strong cycle):** the project operates in a stable environment with maximum liquidity, and price is driven by demand and intrinsic value rather than token unlock mechanics.

▪ **Total Unlock Progress – TBD**

Represents the share of tokens for which no specific distribution or unlock schedule has yet been defined (TBD—*To Be Determined*). This metric helps assess potential risks of future token issuance and its possible impact on market price.

TBD: 0-10%

- **Bear market (weak cycle):** the portion of undefined tokens is minimal, so price pressure risk is moderate. However, investors should still account for possible future emissions.
- **Bull market (strong cycle):** limited reserves support project development without a meaningful impact on market stability.

TBD: 25-50%

- **Bear market (weak cycle):** a significant share of tokens remains undefined, creating moderate to elevated risk of sudden selling pressure once emissions are activated.
- **Bull market (strong cycle):** reserves may support ecosystem growth and incentives, but short-term volatility risk increases.

TBD: 50-80%

- **Bear market (weak cycle):** a high level of uncertainty creates substantial risk of future market pressure if token issuance is realized.
- **Bull market (strong cycle):** reserves can enable strong scaling potential, but large unlock events may trigger noticeable volatility.

TBD: 100%

- **Bear market (weak cycle):** full uncertainty regarding token distribution creates maximum risk for price stability and investor confidence.
- **Bull market (strong cycle):** strong potential for future growth exists, but a lack of transparency can lead to sharp and unpredictable price fluctuations.

▪ **Token Unlocks–Market Dynamics by Group Allocation**

Investors can compare unlock dynamics across allocation groups with market capitalization and token price behavior to assess the influence of each participant category in the short- and medium-term perspective.

Functional purpose: Analyzing unlock schedules by allocation groups makes it possible to identify periods of increased volatility and determine which participants (team, investors, community, reserves) are likely to exert the strongest market impact at specific points in time.

Analytical value:

- Helps identify periods of potential selling pressure on price.
- Assists in evaluating potential liquidity stress and adjusting investment strategies in advance of key unlock dates.
- Enables detection of risks related to simultaneous large-scale token releases entering the market.

- **Token Unlocks–Market Dynamics by Category**

This metric allows investors to analyze the impact of token unlocks across different market segments and incorporate these insights into investment strategy formation.

Functional purpose: Category-based analysis helps identify which types of allocations create the greatest market pressure during specific periods.

Analytical value:

- Identifies categories that increase overall market volatility.
- Enables forecasting of combined impact on market conditions and liquidity.
- Improves risk management by focusing attention on the most influential segments.

- **Token Unlocks–Market Dynamics**

Enables the assessment of how large-scale token releases impact the market across different time horizons.

Functional purpose:

- **Monthly dynamics:** provides a granular understanding of short-term effects of token unlock events on market activity, liquidity, and price behavior.
- **Quarterly dynamics:** allows tracking the concentration of unlock events from a mid-term perspective.
- **Annual dynamics:** forms a high-level view of structural market pressure. Elevated unlock volumes in specific years may create sustained, long-term downward pressure on price.

Analytical value:

- High concentration of unlocked tokens within short timeframes signals potential selling pressure on price.
- Helps anticipate volatility waves and optimize timing for entering and exiting positions.

1. Market Noise and Background "Hype"

Maintain rational judgment and a neutral mindset when facing loud narratives and hype-driven assets. These often create a false sense of missed opportunity and push investors toward emotional decisions. Learn to separate meaningful signals from noise and think strategically by asking the right questions instead of reacting impulsively.

2. Narrative Evaluation

Do not rely on mass "top project" rankings or trending lists. Instead, focus on analytical reports, research papers, and insights from leading funds and major industry players. Study which problems are being solved across existing market segments, what new solutions are emerging, and which niches remain underserved. This approach helps identify long-term trends and uncover projects that genuinely add value to the ecosystem.

3. Comprehensive Project Research

Evaluate both new and existing projects, especially at launch and during early-stage development. Use a broad set of metrics to track growth dynamics and the stability of the economic model. Maintain continuous monitoring and regularly update key data points to support informed, well-reasoned decision-making.

4. Tokenomics Analysis

Tokenomics reflects a project's underlying business model and defines its future trajectory. Carefully analyze allocation structures and token distribution schedules. Pay close attention to large unlock events, reserve volumes, and distribution timelines—these factors directly influence potential volatility and overall risk exposure.

6

CHAPTER

Bitcoin Economic Analysis

"Understanding Bitcoin requires looking deeper—its price is only the tip of the iceberg that attracts millions of crypto enthusiasts."

To truly understand Bitcoin, one must go far beyond its price chart. Market value is only the visible surface, beneath which lies a complex economic system with its own incentives, constraints, and participant interactions. Bitcoin combines monetary policy, payment infrastructure, and a powerful network effect, forming a unique model of digital money without centralized control.

This chapter examines Bitcoin's economy as a unified ecosystem: issuance and scarcity mechanisms, the roles of miners and users, and the impact of halvings, liquidity, and market behavior. This perspective allows us to evaluate Bitcoin not merely as a speculative asset but as a long-term economic experiment that challenges traditional financial systems.

Part I: The Nature of Cyclicality

Financial markets never move in a straight line. Their dynamics resemble a river—shifting direction, sometimes overflowing its banks, sometimes running shallow—forming wave-like trajectories over time. Bitcoin is no exception. Its history is defined by cycles of expansion and contraction, driven by investors, companies, and entire industries. Today, the Bitcoin ecosystem has evolved into a complex financial mechanism that attracts capital and gradually shapes a new economic reality. Yet to truly understand its underlying patterns, it helps to step back and view it through a simple, intuitive metaphor.

Imagine the Bitcoin market as a field governed by natural cycles, much like a farming season. In winter, the land rests. Even with resources and tools, a farmer cannot produce a harvest because conditions are unfavorable. In the digital economy, this phase is known as the crypto winter—a period marked by low prices and reduced market activity.

Spring arrives inevitably. The field is sown and carefully maintained, laying the groundwork for future growth. As conditions improve, the market begins to recover. Early signals of renewal emerge, a new trend starts to form, and cautious investors re-enter the space. Summer represents strength. Crops mature, the field comes alive—and this phase mirrors a bull market. Prices rise, capital flows into the system, and participation expands rapidly. Eventually, autumn arrives—the harvest season. This is when the market reaches peak valuations, and investors realize the rewards of patience and well-timed entry.

No cycle lasts forever. After a period of abundance, winter returns. The field is depleted, and the market is exhausted after prolonged growth. Yet this is precisely the moment for critical reassessment. The farmer analyzes the past season, refines strategies, and prepares new seeds. In the same way, miners upgrade infrastructure, investors rethink their strategies, and the entire ecosystem gradually prepares for the next cycle.

If we look at Bitcoin's price history since the network's launch, the chart indeed resembles a seasonal calendar. Clear patterns emerge: periods of

decline, phases of recovery, strong growth cycles, and subsequent corrections. Even a surface-level analysis of these movements reveals the rhythm of the market and builds an intuitive understanding of cyclicality. This perspective becomes the foundation for deeper analysis and a more informed approach to evaluating future phases of Bitcoin's development.

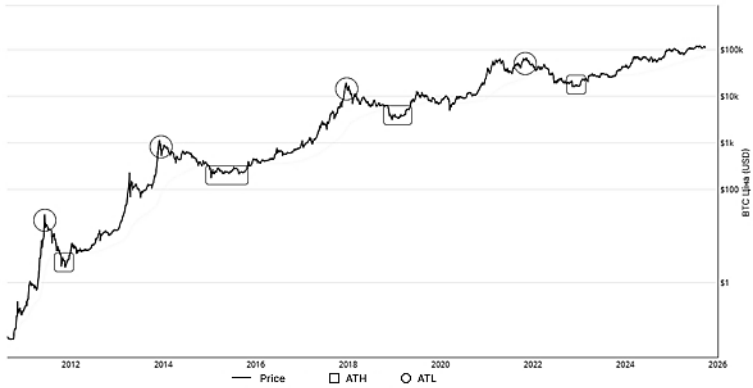


Chart: Bitcoin Historical Price Chart (2011–2025) | **TradingView**

A closer look at Bitcoin's price chart reveals a repeating rhythm. In 2011, 2013, 2017, and 2021, the market reached major peaks, followed by downturns in 2011, 2015, 2018, and 2022. Each time, the journey from crypto winter to a new all-time high took approximately four years.

It may seem as though the market operates on its own internal calendar—where winter inevitably gives way to spring, and spring eventually leads to a new harvest. But in real-world farming, outcomes depend on more than just seasons. Even favorable conditions do not guarantee results if outdated tools and technologies are used. The same principle applies to Bitcoin's economy. Even during bullish phases, participants may fail to achieve expected outcomes if they are not prepared for evolving conditions. In agriculture, tools are critical in the Bitcoin ecosystem, their equivalents are mining hardware and access to energy resources. Their efficiency ultimately determines who can survive each cycle—and who can turn it into profit.

At the system level, the foundation of new cycles is built on mining and halving. These mechanisms create the environment in which the market evolves, gradually shifting the balance between supply and demand and setting the pace for the entire Bitcoin economy. Ignoring these dynamics can turn even favorable conditions into missed opportunities. In contrast, timely upgrades and strategic adaptation open the door to meaningful, outsized results.

That is why a deep understanding of Bitcoin cycles requires examining their technical foundation. In the following sections, we will break down the mechanics behind these processes, analyze the infrastructure that sustains the network, and explain why the four-year rhythm has become an integral part of Bitcoin's economic model. Each new cycle raises the same fundamental questions: what initiates it, why it repeats with such consistency, and which forces ultimately shape its trajectory.

Part II: Mining and Halving

Mining

Mining is what underpins network stability, enables the issuance of new coins, and sets the foundational rhythm for the entire market. At its core, mining is the process of finding the correct hash for a new block. The first participant to achieve this earns the right to add the block to the blockchain and receives a reward in the form of newly minted Bitcoin. This is how the protocol's issuance mechanism is executed.

Mining is the backbone of the Bitcoin ecosystem. It ensures network security, facilitates the creation of new coins, and drives the tempo of market development. In essence, mining involves computing the correct hash for a new block. The first miner to successfully validate a block gains the right to add it to the blockchain and is rewarded with newly issued Bitcoin—this is the mechanism through which new supply enters circulation.

However, the role of mining extends far beyond simple coin creation. It establishes the conditions for uninterrupted network operation and regulates the pace at which new Bitcoin enters the circulating supply. At the same time, mining performs the function of decentralized consensus, ensuring data consistency across all network participants. This property is what makes the system resistant to censorship and external interference.
To maintain this balance, the system automatically adjusts mining difficulty every 2,016 blocks—roughly every two weeks. The purpose of this mechanism is to keep the average block time at approximately ten minutes, regardless of how much computational power is connected to the network.

This is precisely what allows Bitcoin to remain predictable and resilient over the long term. Changes in computational power do not disrupt the overall issuance schedule—they simply alter the requirements for participants. The concepts of hashrate, total network power, and difficulty adjustment mechanisms will be explored in more detail in the next section, where we will focus on mining hardware and its impact on Bitcoin's economic model.

Halving

Halving is a pre-programmed event in the Bitcoin network that occurs every 210,000 blocks—approximately once every four years. At the moment of halving, the block reward for miners is reduced by half. This mechanism is embedded directly into the protocol and operates independently of market conditions or decisions made by individual participants.

The core idea behind halving is to create controlled scarcity of new supply. Conceptually, it resembles the extraction of precious metals—particularly gold—where obtaining new supply becomes increasingly difficult over time. Halving slows the rate at which new Bitcoin enters circulation, suppresses inflation, and gradually reduces the overall issuance pace. The total supply of Bitcoin is capped at 21 million coins. As of the end of 2025, approximately 19.98 million BTC have already been mined—around 95% of the total supply.

According to current estimates, the last Bitcoin will be mined around the year 2140. In the current, fourth cycle, the block reward stands at 3.125 BTC.

However, the economic impact of halving extends far beyond simply reducing miners' rewards. By decreasing the inflow of new supply into the market, halving gradually shifts the balance between supply and demand. When supply contracts while investor interest remains stable or increases, the value of existing coins is reinforced. Market expectations also play a critical role: the anticipation of an upcoming halving often influences investor behavior and sets the stage for future price movements.

Historical data supports this pattern. After each halving event, Bitcoin's price has typically entered a prolonged upward trend. On the corresponding chart, one can clearly observe the boundaries of individual cycles, halving points, price ranges, and key phases of market development—from extended downturns to the formation of new all-time highs.

It is precisely this recurring structure that explains why halving is considered one of the central drivers of cyclicality in Bitcoin's economic model.

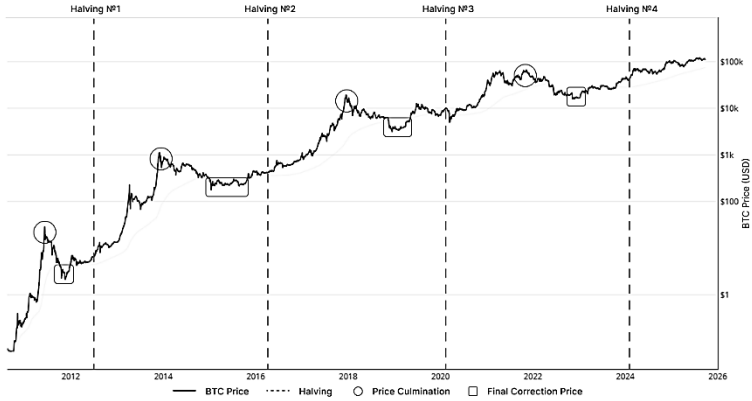


Chart: Bitcoin Halving Events | Period 2011–2025

The table above presents historical data for each Bitcoin cycle. It clearly illustrates how, as the network evolved, the conditions shaped by mining and halving mechanisms changed—and how these shifts influenced overall market dynamics and Bitcoin's economic structure.

These transformations have consistently driven the rapid evolution of mining hardware, which we will explore in greater detail in the next section. After all, it is the hardware that determines hashrate growth, network difficulty levels, and overall system stability—forming the technical foundation of every new market cycle.

CYCLE	HALVING DATE	BLOCK HEIGHT	REWARD (BTC)
Genesis	03.01.2009	0	50
First	28.11.2012	210,000	50 > 25
Second	10.07.2016	420,000	25 > 12.5
Third	12.05.2020	630,000	12.5 > 6.25
Fourth	20.04.2024	840,000	6.25 > 3.125

Table: Bitcoin Network Cycles and Block Rewards | Period 2009–2025

In this context, technological progress is not merely a supporting factor but one of the key drivers behind the ongoing evolution of the entire Bitcoin economy.

Part III: The Network

This section is the key to understanding how Bitcoin's technical architecture brings its economic principles to life. The characteristics of mining hardware determine how mining and halving mechanisms are executed in practice—shaping the pace of new coin issuance, network stability, and the overall conditions that drive market cycles. That's why the technical layer is inseparable from Bitcoin's economic model, directly influencing profitability and the resilience of the entire ecosystem.

Evolution of Mining Technology

Let's begin with mining hardware and trace its evolution under the conditions shaped by each successive halving cycle. In the early days of the network, mining was performed using standard central processing units (CPUs)—the same processors found in everyday personal computers. At that stage, computational difficulty was low, competition was minimal, and virtually anyone with a computer could participate.

CYCLE	HALVING DATE	BLOCK HEIGHT	REWARD (BTC)	HARDWARE GENERATION
Genesis	01.03.2009	0	50	CPU > GPU > FPGA
First	11.28.2012	210,000	50 > 25	GPU / FPGA > ASIC
Second	07.10.2016	420,000	25 > 12.5	ASIC
Third	05.12.2020	630,000	12.5 > 6.25	ASIC
Fourth	05.20.2024	840,000	6.25 > 3.125	ASIC

Table: Technological Evolution of Mining Hardware | Period 2009–2025

As the network expanded and the number of participants increased, mining difficulty rose accordingly. The next stage introduced graphics processing units (GPUs), which delivered significantly higher performance at comparable energy consumption levels. This marked a new era of efficiency

and signaled that mining was transitioning from an enthusiast-driven experiment into a competitive technological race.

The evolution continued with FPGA chips (Field-Programmable Gate Arrays), which allowed for more precise optimization of computational processes and delivered even greater energy efficiency. However, the true breakthrough came with the introduction of ASICs (Application-Specific Integrated Circuits)—specialized chips designed exclusively for Bitcoin mining.

We expand the table with both historical market cycle data and the evolutionary progression of mining hardware to clearly illustrate how changing network conditions—driven by mining and halving—have continuously pushed technological advancement. Each new halving forced hardware to operate more efficiently to maintain profitability while simultaneously increasing overall energy demands.

As a result, the pursuit of energy-efficient solutions became critical. Efficiency ultimately determines mining profitability and the long-term viability of participants within the ecosystem.

Computational Power and Energy Efficiency of Mining Hardware

Over time, older generations of mining hardware gave way to specialized ASIC devices. Each stage of this evolution was marked by a sharp increase in computational power, measured in terahashes per second (TH/s). Early GPU systems delivered anywhere from tens to hundreds of megahashes, while modern ASICs achieve hundreds of terahashes per second—at significantly higher levels of energy efficiency.

The data presented in the table below clearly illustrates the evolution of mining hardware and its computational capacity. It highlights how increasing performance and improved energy efficiency have supported network growth and a stable hashrate. All of these devices—from early CPUs to modern ASICs—operate together as a unified computational infrastructure within the Bitcoin network. Their combined power determines transaction processing speed and overall system security. For this reason, analyzing hardware evolution is not just a technical

retrospective but a key to understanding how network hashrate is formed and sustained.

HARDWARE GENERATION	APPROXIMATE PERIOD	COMPUTATIONAL POWER	UNIT
CPU	2009-2010	1-50	MH/s (megahash/s)
GPU	2010-2012	100-6,000	MH/s
FPGA	2011-2013	10-100	GH/s (gigahash/s)
ASIC (1)	2013-2015	0,5-1	TH/s (terahash/s)
ASIC (2-5)	2015-2018	10-15	TH/s
ASIC (6)	2019-2022	30-480	TH/s
ASIC (7-8)	2023-2025	500-900	TH/s
ASIC (9)	2026	1-1,5	PH/s (petahash/s)
Network Hashrate Units			
1000kH = 1MH > 1000MH = 1GH > 1000GH = 1TH > 1000TH = 1PH > 1000PH = 1EH > 1000EH = 1ZH			

Table: Evolution of Mining Hardware by Computational Power (Network Hashrate Units) | Period 2009–2025

From this data, it's clear how rapidly mining hardware has evolved. Within the first five years after the network's launch, the technological potential of early solutions was largely exhausted, requiring the introduction of more powerful devices. Starting in 2013, several generations of ASICs emerged over the following five years, each significantly outperforming its predecessor. In the years that followed, the pace of innovation accelerated even further—highlighting the extraordinary speed of technological progress in mining.

The primary metric of computational performance is terahashes per second (TH/s), representing the number of calculations performed each second. At the same time, as hardware generations advanced, energy efficiency became increasingly important. This metric reflects how much electrical energy is required per terahash of computation.

Modern ASICs consume significantly less energy per unit of computational power, making them far more economically viable and efficient compared to earlier generations.

HARDWARE GENERATION	POWER CONSUMPTION (W)	PERFORMANCE (TH/S)	ENERGY EFFICIENCY (J/TH)
ASIC (2013-2015)	1000	1	1000
ASIC (2023-2025)	5500	500	~11
ASIC (2026)	11020	1160	9.5

Table: ASIC Energy Efficiency Evolution | Period 2013–2025

These figures demonstrate how technological progress has driven substantial improvements in efficiency—delivering higher computational output with relatively lower energy costs per unit. While early ASIC models (2013–2015) required around 1000 watts per 1 TH/s, modern devices (2023–2025) achieve approximately 500 TH/s at around 5500 watts. Projected 2026 models may reach 1160 TH/s at 11,020 watts—equivalent to roughly 9.5 joules per terahash.

Higher energy efficiency directly reduces electricity costs and increases mining profitability, making it one of the most critical metrics in today's crypto economy. The evolution of hardware has laid the foundation of the Bitcoin ecosystem—making computations faster, energy consumption more efficient, and mining operations more economically sustainable.

Ultimately, the true power of these technologies lies in their collective contribution. Together, they define the network hashrate, total computational capacity, and the overall security of the system.

Network Hashrate

Network hashrate represents the total computational power dedicated to mining within the Bitcoin network. It directly determines the difficulty of discovering new blocks, the level of competition among miners, and the overall stability of the protocol. The higher the hashrate of an individual miner or mining pool, the greater the probability of successfully mining a block and earning the associated reward.

The most critical role of hashrate lies in maintaining network security. A high level of computational power makes a **51% attack** significantly more difficult, ensuring the reliability and integrity of the blockchain. The historical hashrate chart illustrates the growth dynamics of the network since Bitcoin's launch, highlighting key development phases and the impact of each halving on the system's computational capacity.

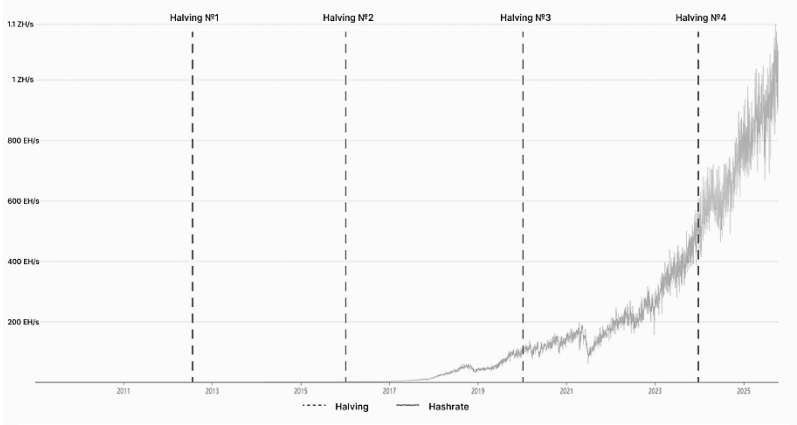


Chart: Network Hashrate Dynamics by Cycle | Period 2011–2025

What we see is a complete timeline of the network's evolution—a steady increase in hashrate from its earliest days. The chart shows how computational power has changed over time, making it possible to identify major milestones and understand how each halving influenced network growth.

Notably, the network's real strengthening began after the second halving. This is no coincidence—this period marked the introduction of new generations of ASIC miners, which dramatically improved mining

efficiency and contributed to both the expansion and stabilization of the network. To better understand the pace of development, it's useful to examine how hashrate has evolved across each cycle.

CYCLE	HALVING DATE	HASHRATE	TOTAL CHANGE (%)	AVG ANNUAL CHANGE (%)
Genesis	01.03.2009	9 kH/s	-	-
First	11.28.2012	29 TH/s	~322,000,000,000	~80,500,000,000
Second	07.10.2016	1.66 EH/s	~5,500,000	~1,375,000
Third	05.12.2020	126 EH/s	~749	~1875
Fourth	04.20.2024	722 EH/s	~473	~118
Current 2025		1.3 ZH/s	~80	~40

Table: Bitcoin Network Hashrate Growth Dynamics | Period 2011–2025

This data reflects the progressive strengthening of Bitcoin's security and stability over time.

Interestingly, transitioning the network to the next order of magnitude in hashrate measurement—such as from kH/s to EH/s or from EH/s to ZH/s—typically takes around three cycles, or roughly 12 years. This gradual progression highlights the system's balanced design, where all processes—from hashrate growth to automatic difficulty adjustment—operate in a finely tuned equilibrium. Mining difficulty plays a crucial role in maintaining a consistent block production time and ensuring uninterrupted network operation.

A 51% attack occurs when a single miner or coordinated group gains control over more than half of the network's total computational power. This would allow them to double-spend transactions or prevent the confirmation of others' transactions, thereby disrupting the normal functioning of the blockchain.

Network Difficulty

Mining difficulty is a core mechanism that sustains the stability of the Bitcoin network. It automatically responds to changes in total computational power, ensuring a consistent block production rate and a controlled issuance of new coins. In other words, the system continuously adapts to the number of active miners: when the hashrate increases, the algorithm raises the complexity of computations when network power declines, it eases the process so that blocks continue to be produced approximately every ten minutes.

To better understand how this adjustment works in practice, it's helpful to look at a network difficulty chart, which illustrates both incremental corrections and the long-term upward trend over time.

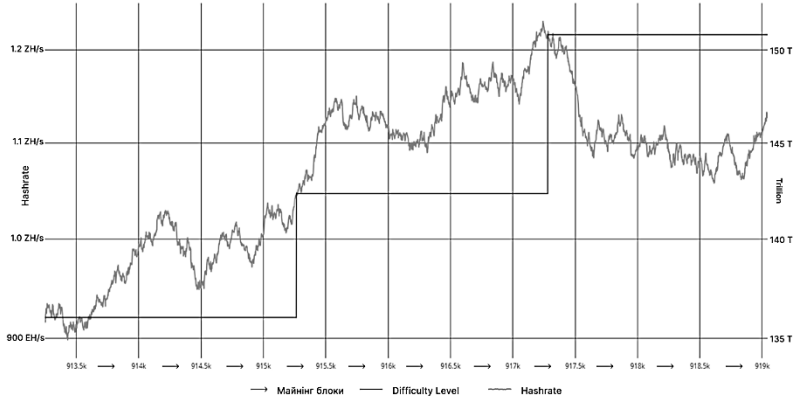


Chart: Network Difficulty Adjustment Process Across Blocks 913,500–919,000

When blocks are found faster than every ten minutes, it signals an increase in total hashrate—meaning more computational power has entered the network than expected. The protocol responds automatically by increasing mining difficulty to slow down block production and restore the average interval to around ten minutes. Conversely, if blocks are produced more slowly, the system detects a drop in hashrate and reduces difficulty to reestablish the target rhythm.

BLOCK	HASHRATE	DIFFICULTY	DIFFICULTY RETARGETING	DIFFICULTY CHANGE (%)
913 500	~950 EH/s	~136 T	-	-
915 500	~1.05 ZH/s	~142 T	+ 6 T	+4.4
917 250	~1.2 ZH/s	~150 T	+ 8 T	+5.6
917 500	~1.07 ZH/s	~146 T	- 4 T	-2.74

Chart: Network Detail Breakdown Across Blocks 913,500–919,000

This mechanism, known as difficulty retargeting, is automatically triggered every 2,016 blocks and maintains network stability regardless of fluctuations in mining power.

By tracing the historical dynamics of difficulty, it becomes clear how it has evolved alongside the growth of hashrate and the broader development of the Bitcoin network. The detailed network table shows that the automatic adjustment mechanism functions efficiently, maintaining system balance: every increase or decrease in hashrate is synchronously reflected in a corresponding change in difficulty. This ensures a stable block production time and uninterrupted protocol operation.

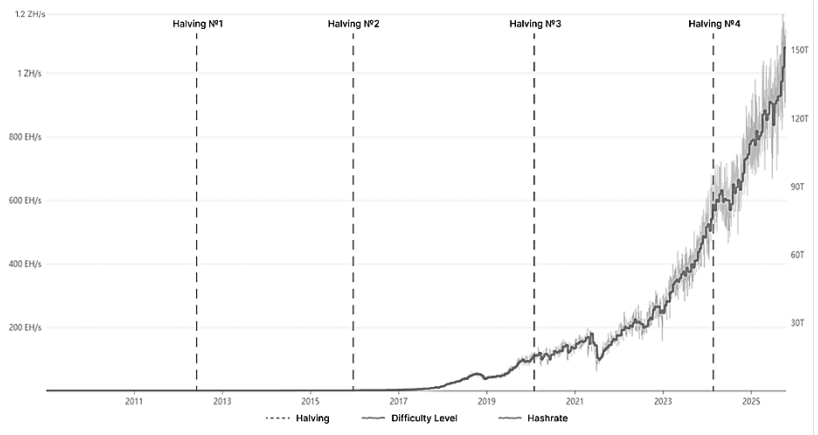


Table: Network Difficulty Dynamics by Cycle | Period: 2011–2025

The following table demonstrates how difficulty has evolved across each halving cycle. Comparing the growth rate of hashrate with the dynamics of difficulty retargeting reveals how coherently the protocol operates.

CYCLE	HALVING DATE	DIFFICULTY	TOTAL DIFFICULTY RETARGETING (%)	AVERAGE ANNUAL DIFFICULTY CHANGE (%)
Genesis	01.03.2009	1	-	-
First	11.28.2012	3.44M	~343,000,000,000	~85,750,000,000
Second	07.10.2016	213G	~6,190,000	~1,547,000
Third	05.12.2020	16T	~7412	~1853
Fourth	04.20.2024	86T	~438	~109
Current 2025		155T	~80	~40

Difficulty Levels Expressed as Growth of the Base Value
1 x 1 000 = **1k** > **1** x 1 000 000 = **1M** > **1** x 1 000 000 000 = **1G** > **1** x 1 000 000 000 000 = **1T** > **1** x 1 000 000 000 000 000 = **1P**

Table: Difficulty Breakdown by Cycle, Including Difficulty Levels | Period: 2011–2025

This synchronization is precisely what ensures network stability and the efficiency of all processes, allowing Bitcoin to remain both resilient and predictable over the long term. Ultimately, it is the interaction between hashrate, mining difficulty, and the halving mechanism that creates a balanced system in which technical parameters directly shape economic dynamics. Understanding this relationship provides deeper insight into how Bitcoin functions and why its model is capable of maintaining integrity and efficiency regardless of external conditions.

Part IV: Market Phases Within the Cycle

The relationship between hashrate and network difficulty exhibits a clear cyclical structure and demonstrates a strong correlation. In this section, we examine the full market cycle by dividing it into four key phases, allowing us to track how changes in miner behavior, hashrate dynamics, and mining difficulty influence Bitcoin's price—and, conversely, how price movements shape the network's response. This approach provides a deeper understanding of the interaction between economic and technological forces that maintain the equilibrium of the Bitcoin network.

Let's take a closer look at the chart, which visualizes the history of all five cycles. Each cycle is marked with a distinct color, while the lower portion of the chart represents the time interval between one halving and the next, outlining a full cycle of approximately 1,450 days.

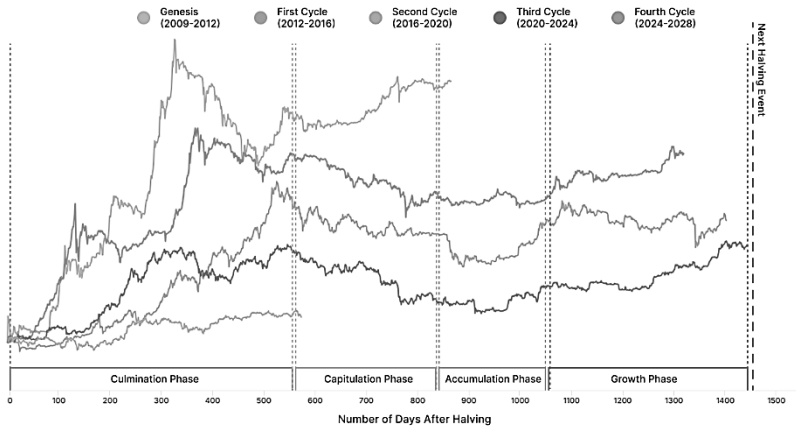


Chart: Full Cycle Breakdown by Phases

Visually, this cycle can be divided into four sectors, each corresponding to a distinct market phase. Every phase carries its own designation and reflects characteristic processes occurring in the asset's price behavior during that period. This framework makes it easier to identify which phase Bitcoin is currently in, understand the forces driving its price dynamics, and see how the network reacts to changes in hashrate and miner activity.

Thus, the following key market phases are identified:

- **Culmination Phase**
- **Capitulation Phase**
- **Accumulation Phase**
- **Growth Phase**

It is important to note that there is no unified consensus among analysts regarding which phase should mark the beginning of a new market cycle. Some argue that the cycle should be measured from the halving, since it triggers a new supply-side economic dynamic for Bitcoin. Others believe the cycle begins with the accumulation phase—the point at which the market reaches its bottom and large investors gradually begin to accumulate the asset.

In this study, we propose a different approach, one that relies not only on price dynamics but also on the internal economic processes of the network. The key driver marking the beginning of a new cycle is the renewal of mining hardware, as it defines the pace of technological advancement, influences hashrate growth, and ultimately shapes the economic logic of the entire cycle.

Accumulation Phase

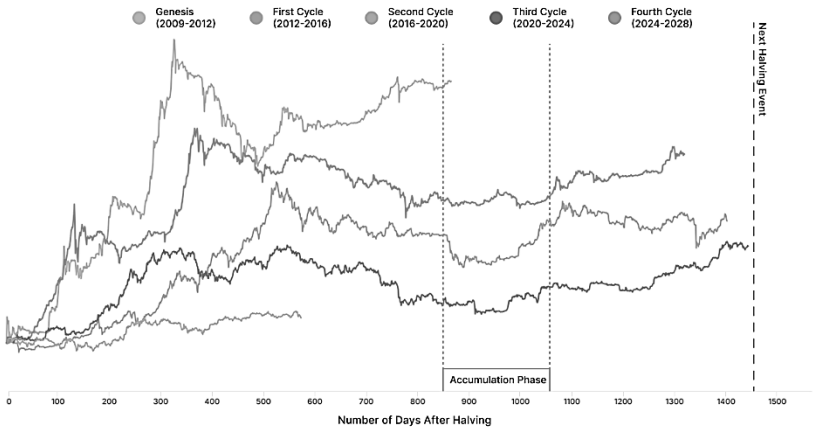


Chart: Accumulation Phase Period

Price. This period can be characterized as a phase of market re-evaluation following deep capitulation. Prices form a local bottom, interest in the asset and the broader market remains subdued, yet this is precisely when a structural reset of the mining economy takes place. The average corrective range is approximately 15–20%.

Mining Operators. Less efficient operators whose operating costs exceed revenues exit the market. This natural cleansing process leaves only participants who have optimized their costs and operate modern infrastructure. In the late accumulation phase—typically 12 to 16 months after a halving—efficient operators begin anticipating the next cycle shift and adjust their strategies: upgrading mining capacity, investing in infrastructure modernization, and placing pre-orders for next-generation ASIC hardware in preparation for increasing network difficulty.

Hashrate and Difficulty. During this period, the first impulse of hashrate growth appears. Inefficient hardware has already been removed from the network, allowing the system to enter a balancing phase: difficulty stabilizes while miners with efficient equipment continue operating with a relative advantage.

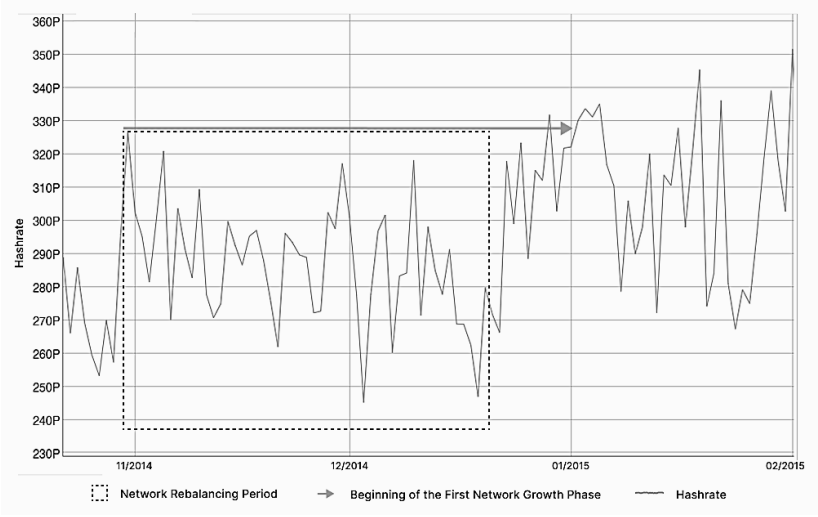


Chart: Hashrate Dynamics During the Accumulation Phase | Period 2014–2015

Data from 2014–2015 illustrates hashrate dynamics during the rebalancing phase following the previous market culmination. A gradual decline in computational power persisted for several months: from November through December 2014, hashrate decreased for over two months. By January 2015, the network began recovering, and in February, hashrate reached a new local maximum, reflecting a strong recovery impulse and the beginning of an active growth phase.

DIFFICULTY CHANGE RANGE (QUARTERLY)	INTERPRETATION
Up to 5%	— Re-entry of mining rigs into the network — Initial phase of mining hardware upgrades
Above 5%	— Active upgrading of mining hardware and network reintegration — Significant increase in operational costs

Table: Estimates of Network Difficulty Changes | Accumulation Phase

Investors: During this stage, investors act cautiously, gradually building their portfolios. They start with small allocations and progressively increase exposure as confidence in both the market and their own positioning grows.

Growth Phase

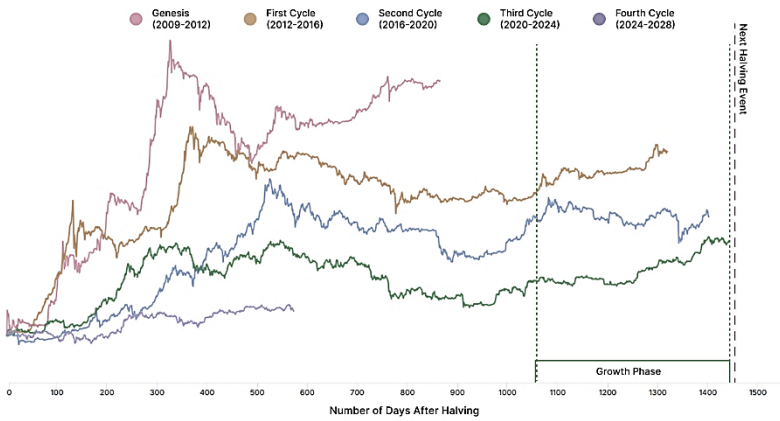


Chart: Growth Phases

Price. The market gradually emerges from stagnation: trading volumes increase and participant interest returns, although price levels have not yet fully reflected the upcoming surge in demand. Supply is still shaped by the inertia of the previous cycle, during which expectations of further decline dominated. However, it is precisely at this stage that the foundations of the next growth cycle are laid.

The market capitalization index begins to rise steadily, indicating active accumulation of positions by large players. The average corrective range in this phase is approximately 20–35%.

Mining Operators: Roughly 6–9 months before the halving, mining operators begin actively preparing for changes in profitability structure. They aggressively upgrade ASIC fleets, anticipating reduced block rewards, and invest in improving energy efficiency to offset the expected decline in revenues.

During this period, new generations of mining hardware enter the market, signaling the start of another technological cycle and a transition to next-generation machines. A "modernization race" emerges: companies with early access to the latest ASICs gain a significant competitive advantage due to lower pre-halving production costs.

The overall hardware upgrade rate at this stage typically reaches around 20% of total network capacity

Hashrate and Difficulty: In this phase, both hashrate and difficulty begin to rise at an accelerated pace, approaching exponential dynamics. The network enters a period of rapid expansion of mining capacity, directly driven by large-scale deployment of next-generation hardware. This growth reflects not only network expansion but also increased computational resilience and a strengthening market conviction that a new cycle is forming.

Data from 2015–2016 clearly illustrates this dynamic. Starting in July 2015, the network entered an active expansion mode that continued until the halving in July 2016. Over this roughly one-year period, hashrate increased from approximately 400 PH/s to 1.8 EH/s—more than a fourfold growth. This trajectory is a direct confirmation of the first large-scale wave

of next-generation mining hardware adoption and the transition of the network into a qualitatively new development phase.

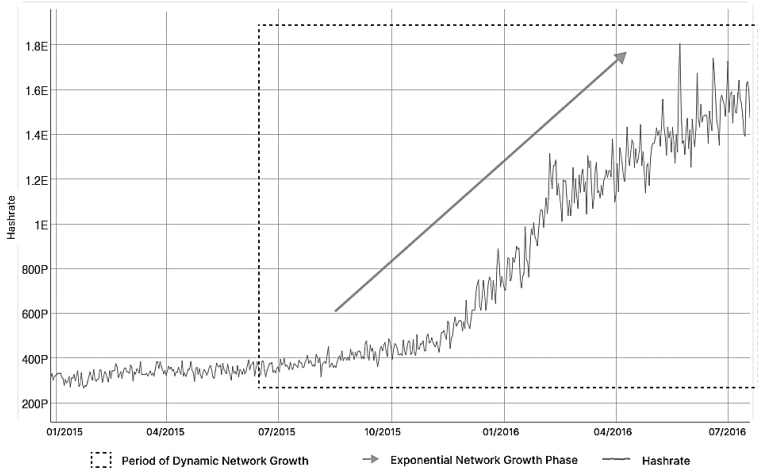


Chart: Hashrate Dynamics During the Growth Phase | Period 2015–2016

DIFFICULTY CHANGE RANGE (QUARTERLY)	INTERPRETATION
3-5%	— Systematic mining hardware upgrades
8-10%	— Active hardware upgrades and expanded network connectivity — Significant increase in operational costs
Above 10%	— Anomalous phase where all types of equipment are deployed, driven purely by price incentives

Table: Estimates of Network Difficulty Changes | Growth Phase

Investors: During this period, retail investor activity increases as they gradually expand their exposure amid price recovery from previous declines. At the same time, institutional participants begin building initial positions, while the informational environment shifts from neutral to positive.

Collectively, these factors create the perception of the beginning of an uptrend, although its foundation is established much earlier—during the phase of rising hashrate and mining infrastructure modernization.

Culmination Phase

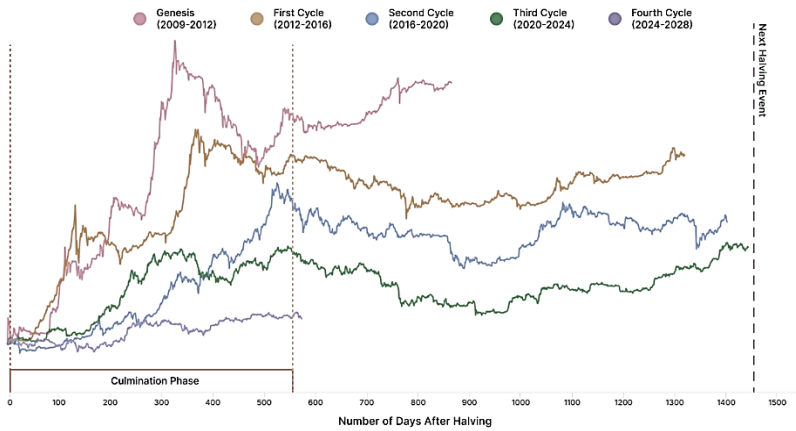


Chart: Culmination Phase Period

The market's culmination phase consists of three sequential stages that define its internal structure and dynamics: the halving event, the post-halving period, and the final rally toward the cycle peak. This phase typically lasts no more than 580 days after the halving, during which the market transitions from initial adjustment to the formation of a full cycle top.

To better understand the mechanisms of this phase, it is useful to analyze each stage separately, focusing on changes in price, hashrate, mining economics, and investor behavior.

Halving Moment

Price: During the halving, the market experiences heightened volatility. Price typically reaches a local peak shortly before the event, followed by a correction. Although no immediate price surge is usually observed, the halving acts as a structural turning point: issuance is reduced, inflationary pressure weakens, and the market gradually transitions from rebalancing

into the formation of a new upward trend. The typical correction range is 20–35%.

Mining Operators: At the moment of halving, miners face a 50% reduction in block rewards, sharply decreasing profitability. Less efficient rigs are shut down, while large players with sufficient liquidity redirect capital toward infrastructure upgrades and expansion. The mining market temporarily enters a redistribution phase: weaker participants exit, while efficient operators strengthen their positions in preparation for the next growth stage. The overall hardware upgrade rate at this stage is approximately 50%

Hashrate and Difficulty: Following the halving, the network enters a short rebalancing period. Reduced rewards make part of the hardware unprofitable, leading to a temporary decline in hashrate, while difficulty automatically adjusts downward to maintain system equilibrium.

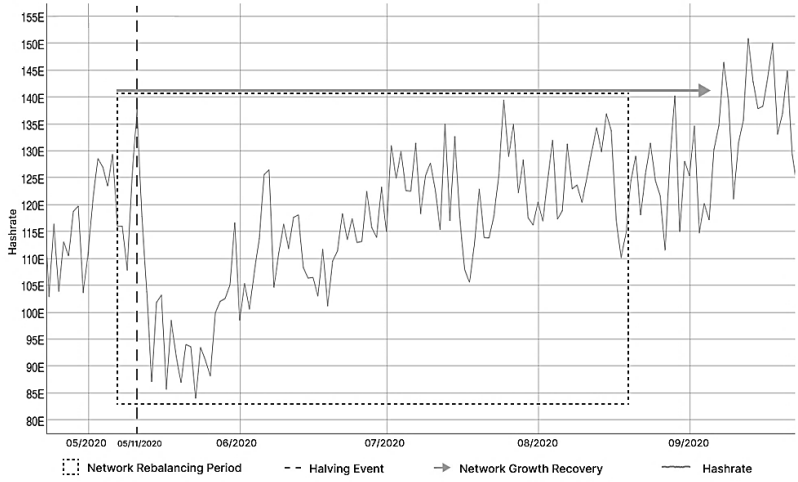


Chart: Hashrate Dynamics During the Culmination Phase | Halving 2020

In May 2020, for example, although the event itself lasts only minutes, the network's response is nearly immediate: hashrate fluctuates sharply due to the shutdown of inefficient mining equipment. In the following months, large-scale operators deploy newer and more efficient rigs, stabilizing network performance and gradually restoring growth. This stage effectively becomes the starting point of a new expansion cycle.

Investors: At the halving moment, some participants—particularly mining companies—realize profits by selling accumulated Bitcoin, as new coin issuance slows by half. These sales help cover operational costs and finance hardware upgrades, maintaining market liquidity and laying the groundwork for the next investment cycle.

When price approaches previous highs, institutional investors often partially lock in profits, potentially triggering short-term corrections. Retail investors tend to react more emotionally, while large institutional players, focusing on fundamental network shifts, gradually accumulate positions. This accumulation ultimately forms the foundation for the subsequent upward trend, supported by technological upgrades and ongoing mining infrastructure modernization.

Post-Halving Period

Price: After the halving, the market transitions into a growth phase, with Bitcoin's price breaking through previous cycle highs. The reduction in issuance amplifies coin scarcity, reinforcing a sustained upward trend. Demand from both institutional and retail investors increases, creating additional momentum for price appreciation.

Mining Operators: As Bitcoin's price rises, mining profitability increases significantly, and even previously unprofitable hardware becomes viable again. This drives miners back into the network and accelerates the deployment of new mining farms. The market enters an active expansion phase, where operators seek to fully capitalize on the "golden profitability window." The overall hardware upgrade rate during this stage reaches approximately 70%.

Hashrate and Difficulty: Over the roughly 525–580 days following the halving, hashrate demonstrates exponential growth, repeatedly reaching new all-time highs, reflecting maximum computational participation in the network. Mining difficulty adjusts every two weeks and shows a steady upward trajectory.

Data from the first 550 days after the 2020 halving illustrates this trend clearly: from May 2020 to November 2021, hashrate increased from

approximately 85 EH/s to 220 EH/s—more than doubling. A particularly notable acceleration occurred in May–June 2021, a critical inflection point for understanding the formation of the final phase of the market cycle, which will be discussed next.

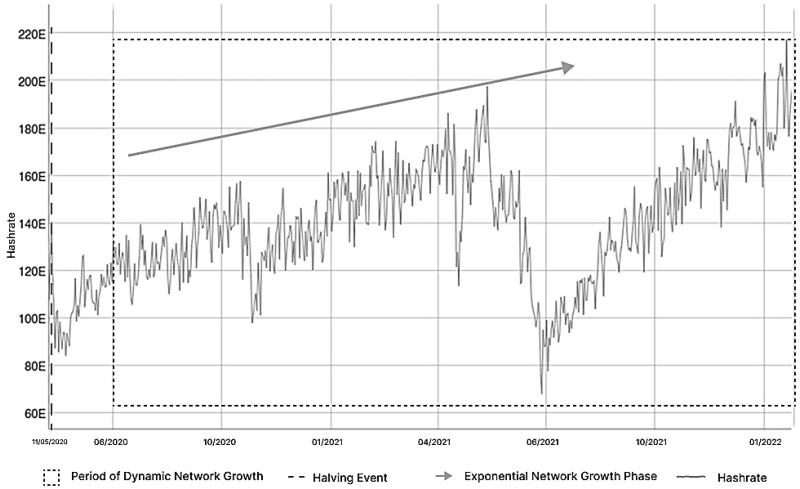


Chart: Hashrate Dynamics During the Culmination Phase | Post-Halving 2020–2021

Investors: During the post-halving period, the market is dominated by rising optimism, attracting both retail and institutional participants. Bitcoin is increasingly perceived not only as a speculative asset but also as a store of value. Institutional funds, ETFs, and corporate investors actively expand their positions, anticipating further supply compression.

Formation of the Market Culmination

Mining Operators: At this stage, the hardware upgrade rate reaches approximately 80%. At the same time, even older and less efficient mining rigs remain in operation, as the high price of Bitcoin makes their continued use economically viable.

Hashrate and Difficulty: In this phase, hashrate reaches record levels as the maximum amount of new mining hardware is deployed into the network, sharply increasing total computational power. Mining difficulty rises in parallel. This resource saturation creates the structural conditions for the cycle's final stage and the transition into capitulation.

Historical data confirms this pattern. In the 2016–2017 cycle, after the halving, hashrate peaked at approximately 12 EH/s before correcting to around 5.5 EH/s—an indication of network saturation occurring roughly on the 483rd day after the halving.

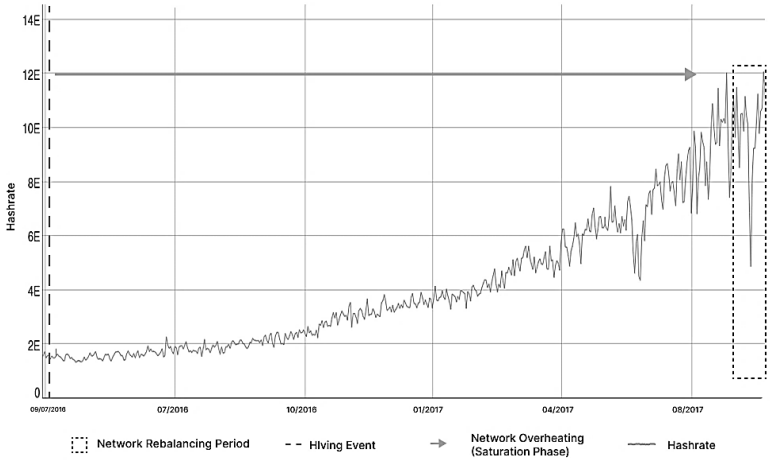


Chart: Hashrate Dynamics During the Culmination Phase | 2017 Cycle Peak

A similar dynamic was observed in the 2020–2021 cycle, where hashrate increased to approximately 200 EH/s before sharply correcting to around 70 EH/s. The peak phase occurred around the 365th day after the halving, reflecting network overheating and the subsequent capitulation of less efficient miners.

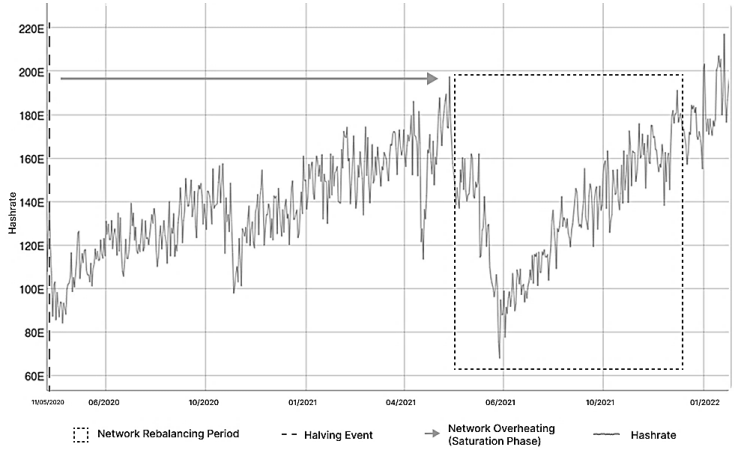


Chart: Hashrate Dynamics During the Culmination Phase | 2021 Cycle Peak

In the 2024–2025 cycle, an even larger trajectory was recorded: hashrate grew to approximately 1.3 ZH/s before declining to around 700 EH/s. The culmination point occurred around the 520th day after the halving, indicating longer infrastructure development cycles and a more inertial network response.

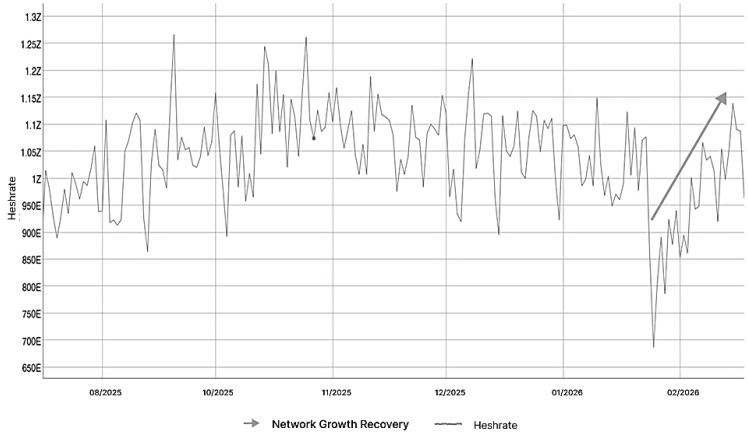


Chart: Hashrate Dynamics During the Culmination Phase | 2025 Cycle Peak

To more precisely identify the point of network saturation, it is useful to rely on quarterly difficulty dynamics. A slowdown in its growth rate serves as a leading indicator of the network reaching a plateau.

DIFFICULTY CHANGE RANGE (QUARTERLY)	INTERPRETATION
Up to 3%	— The network is already on a plateau, early conditions for miner capitulation are forming — High cost environment
Up to 5	— The network is transitioning into a plateau phase, early signs of formation appear — High cost environment

Table: Estimates of Network Difficulty Changes | Culmination Phase

The key marker of this slowdown during the culmination phase is a quarterly difficulty growth rate below 5%. This threshold serves as a reference point for defining the cycle's culmination period.

Price: As the network enters a plateau phase, price moves into a period of heightened volatility and localized corrections. Miner operating costs reach their peak, while market prices do not always cover production expenses, reducing overall profitability. Under such conditions, part of the mining hardware is temporarily taken offline. The average correction range is around 15%.

Paradoxically, these conditions create the foundation for the final impulse. After partial network cleansing during the plateau phase and elevated costs, some miners exit the market, coinciding with the formation of new all-time highs and the cycle peak. This stage is marked by maximum optimism and emotional intensity among retail investors, driving prices to new historical highs. At the same time, rising volatility reflects the end of the overheating phase and the approach of a structural market reversal.

Historical observations confirm this pattern. The second cycle, the price peak was recorded on December 16, 2017—526 days after the halving. In the third cycle, the peak formed in two stages: April 13, 2021 (day 338) and November 8, 2021 (day 547). In the fourth cycle, the peak was reached on October 6, 2025—533 days after the halving.

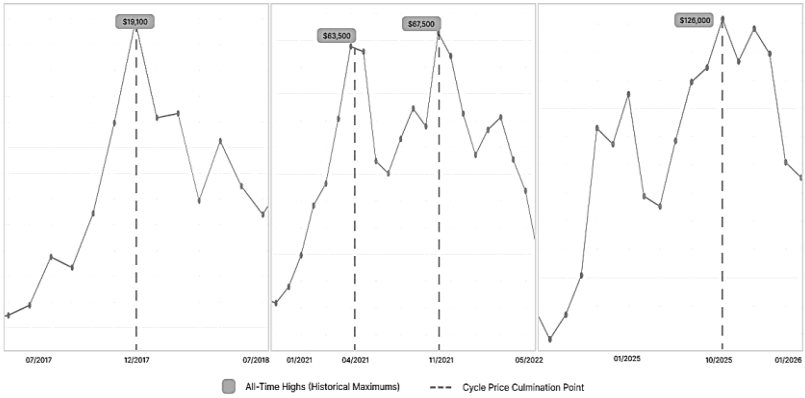


Chart: Price Culmination Points Across Cycles | 2017, 2021, 2025

These data suggest that the final market culmination consistently occurs within a range of approximately 525–580 days after the halving, regardless of individual cycle differences.

Investors: This phase is characterized by large-scale capital rotation. Long-term holders, mining companies, and institutional participants begin actively realizing profits. At the same time, retail investors show increased demand, often driven by expectations of further upside.

Mining companies systematically lock in profits throughout the culmination phase. The typical premium range starts at 20–30% above market price and gradually expands to 30–50%. This increases selling pressure, contributing to the completion of the market peak formation while simultaneously setting the stage for the subsequent correction and redistribution of market forces.

Capitulation Phase (Cycle Completion – Reset Phase)

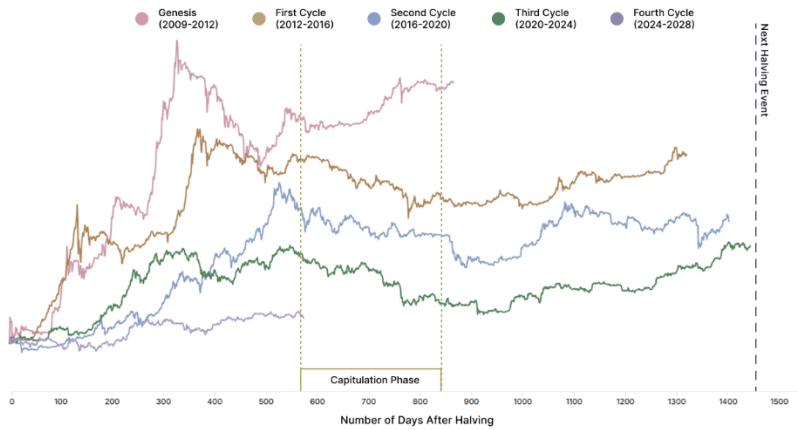


Chart: Capitulation Phase Structure

Price: During this stage, price moves within a constrained range for an extended period. At first glance, it may resemble a standard correction or consolidation phase, but in reality, it reflects a planned distribution and exit of capital. This is a structural pause before the cycle's completion, after which the market transitions into a prolonged downtrend.

This phase is characterized by deep drawdowns, with total corrections typically exceeding 50%, while historically, previous cycles have seen declines reaching beyond 75% from the cycle peak.

Mining Operators: Miners enter one of the most challenging phases of the entire cycle. Prolonged low profitability—or operations at breakeven levels—forces the shutdown of all but the most energy-efficient hardware, while the rest is gradually decommissioned. The primary objective becomes liquidity preservation and cost minimization until price conditions recover.

Hashrate and Difficulty: Despite deteriorating market conditions, hashrate often continues to rise or remains elevated due to the delayed deployment of mining hardware ordered during the previous culmination phase. However, growth momentum slows significantly, consistent with historical patterns.

A clear example is the 2021 cycle: after the price peak in October 2021, the network hashrate continued to increase until May 2022, reflecting the lagged response of mining operators to structural market changes. Only after the full deployment cycle of new equipment was completed—and weaker miners exhausted their financial reserves—did hashrate begin a sustained decline, signaling the end of the cycle and the transition toward the next rebalancing phase

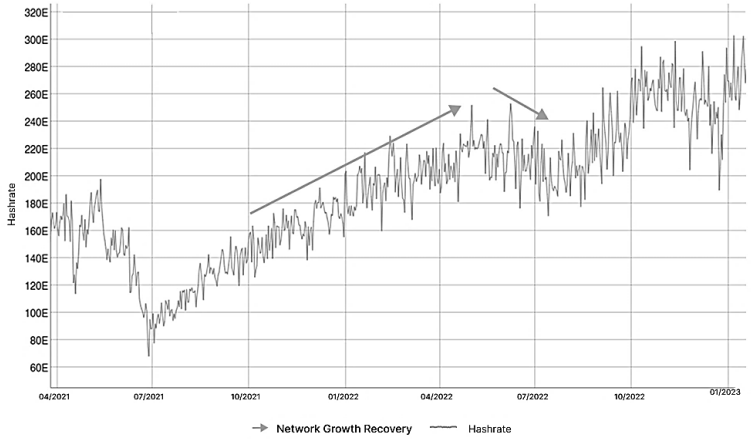


Chart: Hashrate Dynamics During Correction Period | 2021 Capitulation

In the 2025 culmination, the network response was fundamentally different. Due to widespread integration of artificial intelligence across mining operations, companies were able to significantly accelerate adaptation and synchronization with structural network changes.

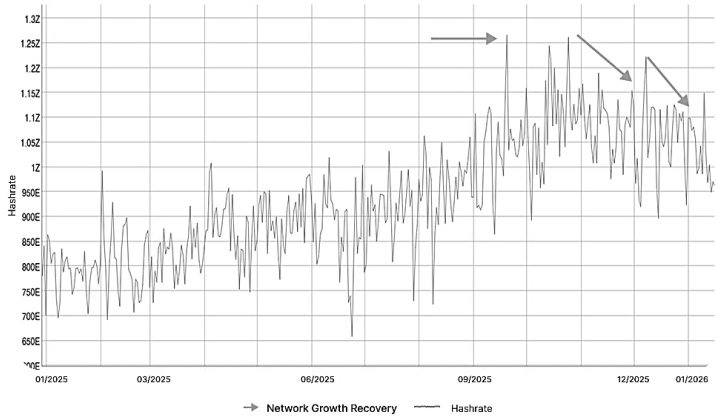


Chart: Hashrate Dynamics During Correction Period | 2025 Capitulation

This allowed new capacity to be deployed in a more controlled and efficient manner during the formation of the new all-time high in September 2025, reducing inertial hashrate growth and preventing excessive network saturation. As a result, the network maintained a more stable difficulty profile even under high load conditions, enabling miners to preserve higher profitability and liquidity throughout a longer period—extending directly into the final phase of the cycle, the capitulation stage.

Investors: After the market peak, a gradual downturn begins, accompanied by rising panic among participants. An initial decline of up to -25% triggers the first wave of emotional selling, primarily from retail investors. This mass exit increases selling pressure and deepens the correction toward levels around -35%.

At this stage, larger players—including ETFs and corporate investors—begin to participate in distribution, reinforcing the downward momentum. Given the extended duration of the correction phase (typically 8–12 months), the final pressure often comes from miners themselves. Their ongoing need for liquidity to cover operational expenses forces additional asset sales, further accelerating price declines.

Ultimately, price reaches a cyclical bottom, typically representing a decline of more than -50% from the new all-time high. This level signals the completion of the bear market and naturally sets the stage for the next

accumulation phase, where the most resilient participants gradually build long-term positions and prepare the market for a new upward cycle.

Part V: Economic Aspects

A key factor behind the resilience of the Bitcoin network is the efficiency of mining hardware and the actual cost of production. Quarterly estimates from leading analytics firms provide only a high-level view of the industry and are often conditional in nature, as large-scale operators employ different mining models, energy sources, and hedging strategies. It is the combined effect of these approaches that shapes the real economics of mining—ultimately determining the network's resilience and miners' ability to withstand price volatility.

Mining Aspect

Below is the cost trajectory of mining 1 BTC across ASIC generations, calculated on a clean cost basis, meaning energy costs only (*energy cost*). These data points provide a clearer view of miners' true economic resilience across different phases of the market cycle.

YEAR	HARDWARE CLASS	OST OF MINING 1 BTC
2018-2019	ASIC S17	$6,500 – $7,500
2020 - post-halving	ASIC S17	$12,500 – $16,000
2021-2023	ASIC S21	$19,000 – $25,000
2024 - post-halving	ASIC S21	$38,000 – $55,000
2025-2027	ASIC S23 Hyd	$23,000 – $48,000
2028 - post-halving*	ASIC S23 Hyd	$88,000 – $105,000*
2029-2031*	ASIC S25*	$75,000 – $155,000*
2032 - post-halving*	ASIC S25*	$300,000 – $345,000*

Table: Cost Dynamics of Mining 1 BTC | Period 2018–2032

* *Forecast data based on a comprehensive analysis of mining hardware evolution and expected efficiency gains in future ASIC generations.*

- **Declining Efficiency of Legacy Models**

Older ASIC generations rapidly lose competitiveness in the post-halving period. As network difficulty increases, their performance no longer offsets electricity costs, forcing operators to gradually phase out such equipment and optimize their capacity structure.

- **Efficiency Gains in New Generations**

Modern ASICs deliver significantly higher hashrate with lower energy consumption. This allows for a substantial reduction in the cost of mining one BTC and helps maintain profitability even during price downturns, increasing overall industry efficiency.

- **Clean Costs (Energy Cost)**

Focusing on energy costs provides the most objective view of miners' resilience to price volatility. This metric becomes critical during bear market phases and extended periods of low market activity, effectively defining the profitability threshold.

- **All-in Costs (Hardware Cost)**

For technologically advanced operators, energy costs typically account for 25–35% of total expenses, while for less efficient participants, they exceed 40%. This creates a significant gap in breakeven levels and the ability to withstand prolonged corrections and periods of instability.

- **Strategic Indicator**

Mining acts as a leading market indicator. The economics of production often determine the formation of local bottoms and cycle peaks, serving as a key driver of network development and a long-term forecasting tool for price, reflecting deep structural shifts within the ecosystem.

Cost Structure Aspect

Network equilibrium is determined by the interaction of two key factors. The first is internal parameters and changes driven by the halving, which impact difficulty, hashrate, and miner efficiency. The second is the market price of the asset, which drives network adaptation and adjustment, as illustrated in the diagrams.

- **Network Equilibrium**

This is shaped by internal network parameters and changes triggered by the halving, along with subsequent hardware upgrades. The halving establishes a new baseline for block rewards, directly influencing mining economics, while the deployment of more efficient hardware determines hashrate dynamics and the level of network difficulty.

As a result, these factors not only define the parameters of each new cycle but also set the pace at which the network adapts to changing conditions. The network continuously seeks a new equilibrium between costs and rewards, where hardware efficiency plays a decisive role.

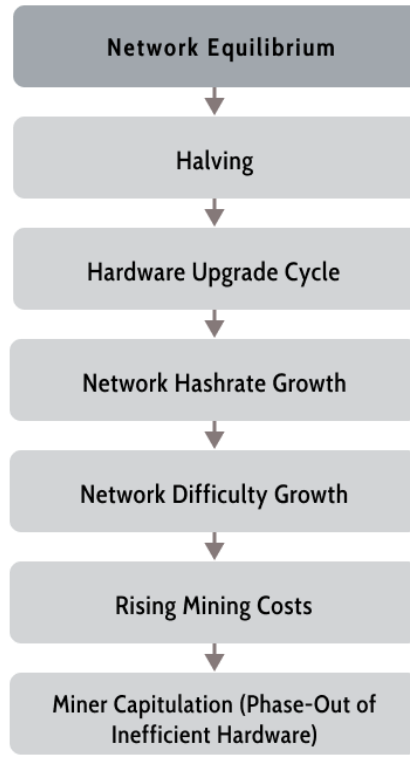


Diagram: Network Equilibrium Cycle in Mining

This process forms the network equilibrium cycle, in which miners operate under constant competitive pressure—forcing less efficient participants out of the market and driving continuous technological upgrades and cost optimization across the network.

- **Price Equilibrium**

Price equilibrium is determined by the market value of the asset, which influences the decisions of miners and investors regarding market entry and exit, hardware upgrades, and accumulation strategies, as illustrated in the diagrams below.

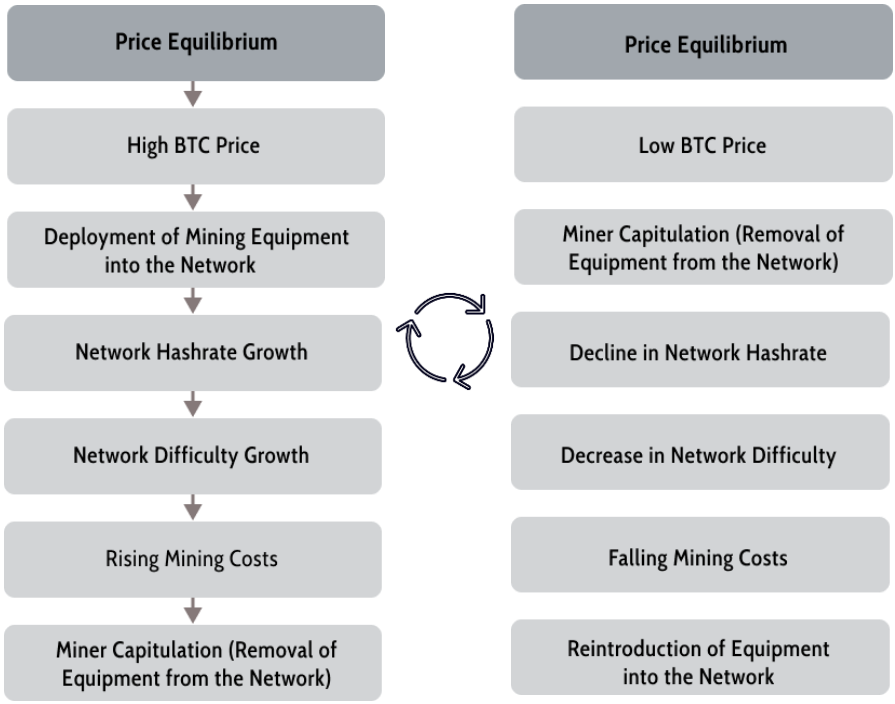


Diagram: Price Equilibrium Cycle in Mining

Price acts as a balancing mechanism—its growth incentivizes network expansion through the deployment of additional mining equipment. This, in turn, strengthens the network effect by increasing hashrate and difficulty. Such dynamics create conditions for rising production costs in subsequent periods, prompting participants to partially realize profits. This leads to price corrections toward levels that are less favorable for mining, creating the need to temporarily remove part of the equipment from the network and wait for more favorable difficulty conditions before re-entering.

In the opposite direction, the mechanism operates symmetrically: a decline in price reduces mining activity, leading to a drop in hashrate and a subsequent decrease in difficulty, which gradually lowers the cost of production. This restores profitability for more efficient operators and creates conditions for re-entry into the network, initiating a new phase of growth.

1. Cyclicality

The Bitcoin market evolves in cycles: periods of growth and decline are shaped by a combination of market conditions and technical factors, primarily mining and halving. Hardware efficiency and the ability of participants to adapt determine the outcome of each cycle and the strength of the next one.

2. Network

The Bitcoin network is a dynamic digital organism with evolving parameters that define the rhythm and development of the ecosystem. The technological evolution of mining hardware—from CPU to modern ASICs—forms the foundation of hashrate and difficulty, ensuring network stability and resilience.

3. Hashrate

Hashrate reflects the total computational power of the network and determines its security, efficiency, and stability. Growth in hashrate signals the deployment of new capacity and hardware upgrades, while declines indicate the exit of less efficient miners. Its dynamics are closely tied to market cycle phases, investor behavior, and broader economic processes.

4. Economic Aspects

Analyzing key economic metrics allows for a clearer assessment of network and market prospects, identification of breakeven levels, and understanding of capitulation thresholds. This reduces risk and supports more effective investment strategy planning.

7

CHAPTER

Vision of the Future

"It is essential to focus exclusively on long-term development—this is the key to understanding the future."

The future is not shaped by short-term trends but by consistent decisions made with a long-term horizon. That is why understanding a long-term vision is critical—it allows us to separate temporary market noise from structural shifts that define the evolution of technology, the economy, and society. Focusing on strategy rather than short-term fluctuations opens a deeper level of analysis.

This section centers on the future role of decentralized systems, digital assets, and emerging financial models within the global economy. The focus is not on price predictions but on the evolution of infrastructure, user behavior, and the interaction between governments, businesses, and technology.

Long-term development is the key to understanding how today's decisions shape tomorrow's reality. Only through the lens of time can we assess the viability of an idea, its ability to adapt, and its capacity to create value in an ever-changing world.

Part I: Bitcoin

Transformation of Monetary Control

Historically, nation-states and financial institutions have exercised control over the economy through banks, large corporations, and credit systems. A significant portion of this influence has been concentrated in the hands of a few financial giants capable of stabilizing markets during periods of crisis—a classic example being the role of JP Morgan in the United States, when a private company helped the country withstand a financial collapse. Over time, this mechanism only intensified the concentration of economic power within a limited circle of institutions and corporations.

In this context, Bitcoin emerges as a fundamentally new instrument for redistributing monetary power, shifting control of the financial system from centralized structures to a decentralized network of participants. Its architecture is built on programmable rules: BTC issuance is strictly capped by the protocol, and gaining control over the network would require more than 50% of the computational hash rate—an outcome that is both economically and technically impractical.

Bitcoin's autonomy is ensured through the direct execution of transactions without intermediaries. Miners earn block rewards and transaction fees independently of political pressure, while users retain full sovereignty over their assets. During times of crisis, BTC can function as an alternative reserve, shifting the center of control away from institutions and toward the network and its participants.

At the macro level, this reduces the influence of large financial corporations on state monetary policy. Control over the monetary system becomes decentralized and algorithmic, governed by protocol rules and the network's economic activity. A new form of power emerges—distributed, economically incentivized, and autonomous.

In this sense, Bitcoin can be viewed as a digital organism that moves monetary control beyond the boundaries of the traditional financial system. Power is no longer tied to governments or corporations but is instead shaped through code, algorithms, and consensus, forming a parallel

layer above the fiat monetary system. As a self-sustaining economic system, it delivers decentralization of monetary authority, resilience, transparency, and independence from centralized entities.

Integrating a New Asset into the Investment Portfolio

For decades, the primary investment instruments have included equities, bonds, real estate, and derivatives. Their stability has largely depended on decisions made by governments and major financial institutions. However, rising debt levels, inflation, and the concentration of capital within corporations have gradually eroded trust in traditional wealth preservation models.

Against this backdrop, Bitcoin has emerged as a new investment asset. It is a digital asset with a fixed supply—capped at 21 million coins. Its rules are embedded in the protocol and cannot be altered by any government or corporation. Bitcoin combines the characteristics of an asset, a store of value, and an independent financial system.

BTC is often compared to gold due to its ability to hedge against fiat currency debasement. The issuance of new coins decreases over time, creating scarcity and incentivizing long-term accumulation. The asset is not tied to any specific country or company: its price is determined by a global network of users and miners, and it trades 24/7.

Bitcoin holders maintain full control over their assets—without banks or intermediaries that could freeze funds. This fundamentally differentiates BTC from equities, bonds, or ETFs.

As of 2025, institutional investors are increasingly integrating Bitcoin into their portfolios. BTC allocations remain relatively moderate: approximately 35% of funds allocate 1–5% of their capital to BTC, with a significant portion planning to increase this share in the coming years—aiming to exceed a 5% allocation to cryptocurrencies overall.

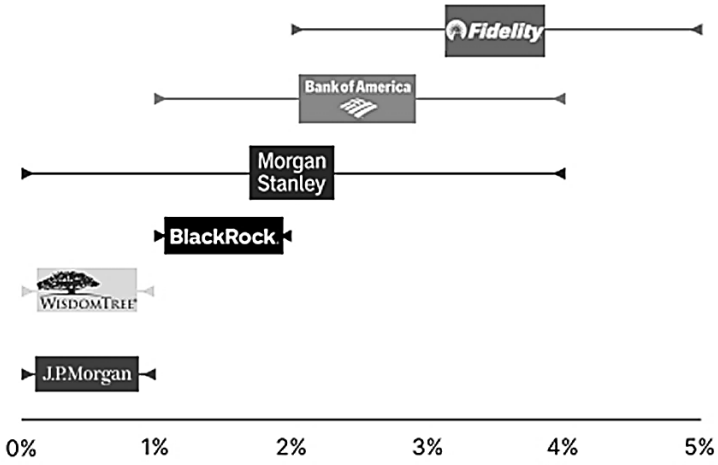


Chart: Recommended BTC Allocation in an Investment Portfolio | **RIVER**

Compared to the 1–3% average institutional allocation to cryptocurrencies just a few years ago, current trends indicate a steady increase in interest in Bitcoin as a strategic portfolio component—particularly driven by the launch of regulated instruments, including spot ETFs.

Research shows that institutions now control approximately 17% of the total circulating BTC supply, including holdings by corporations, funds, and ETFs—a significant advancement compared to previous years.

Potential Challenge: 50% Network Concentration

In decentralized cryptocurrencies like Bitcoin, the core principle is the absence of centralized control. The network operates through thousands of independent participants—miners and nodes—who validate transactions and maintain the blockchain.

However, there is a critical threshold: if a single participant or coordinated group controls more than 50% of the network's computational power (hash rate), the risk of a "51% attack" emerges. This creates the possibility of temporary influence over network operations and decision-making. In such a scenario, attackers could reorder transactions or block certain operations, undermining both the security of the network and user

trust. This is why maintaining hash rate decentralization and distributing computational power across many participants is essential.

This scenario becomes more plausible due to the growing concentration of mining infrastructure, driven by several factors:

- **Large mining pools** aggregate individual miners to ensure stable income, concentrating control in the hands of a few organizations.
- **Geographic concentration** in regions with cheap electricity increases the risk of localized influence over the network.
- **High capital costs** of advanced hardware (ASIC miners) limit accessibility for smaller participants, increasing the dominance of large players.

As of 2026, network analysis shows that smaller mining groups and "unknown" participants—who previously contributed to decentralization—are gradually exiting the market. Their share is being absorbed by major pools such as Foundry USA, AntPool, and ViaBTC. Most notably, Foundry USA's share has grown from approximately 7% to 33% by 2026, signaling a clear trend toward centralization. This shift indicates that the network is becoming less distributed, with influence over blockchain decision-making increasingly concentrated among a limited number of players. Such concentration raises the potential risk of coordinated attacks and reduces the system's resilience to both internal and external threats.

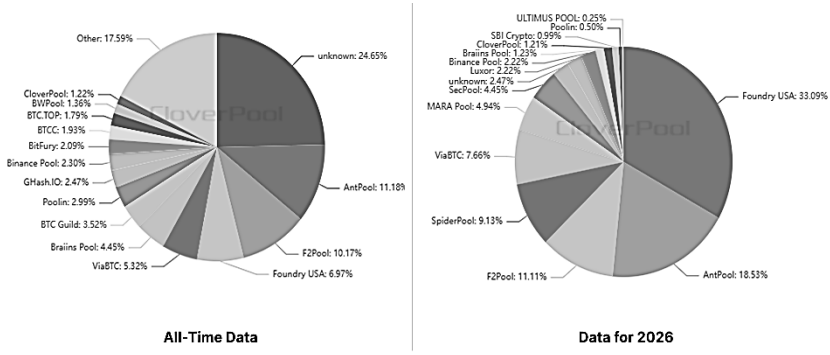


Chart: Network Decentralization by Mining Pools | Cloverpool

To better understand the implications, it is important to examine what control over more than 50% of the hash rate actually enables—and what it does not.

Capabilities with >50% Hash Rate Control vs. What Is Impossible in the Bitcoin Network:

POSSIBLE ACTIONS:	NOT POSSIBLE IN THE BITCOIN NETWORK:
Double-spend one's own coins	Increase BTC supply beyond 21 million
Delay other users' transactions	Seize or confiscate others' coins
Influence transaction confirmations by reordering blocks	Burn (destroy) others' coins
Temporarily reorganize recent blocks	Rewrite blockchain history prior to mined blocks
Temporarily block new transactions	-

Table: Capabilities and Limits of a 51% Attack

Potential strategies to counter centralization:

1. **Global distribution of mining infrastructure**.

Expanding mining operations across countries and continents could reduce dependence on specific regions. However, this trend remains unlikely in the near term due to infrastructure constraints and unequal access to low-cost energy.

2. **Protocol-level technical adjustments**.

This is the most effective mechanism. Examples include::

- Adaptive consensus mechanisms that reduce rewards for oversized mining pools
- Increased incentives for smaller or independent miners
- Mechanisms that make centralized attacks less economically viable, which encourage long-term participation and align incentives between users and protocols.

Such changes would encourage a more balanced distribution of hash rate, enhance network resilience, and preserve its decentralized nature.

Given the rapid growth of hash rate controlled by individual companies, the possibility of a 51% attack cannot be entirely dismissed. It may represent another phase in the network's evolution—one that Bitcoin will need to navigate. Excessive centralization partially undermines Bitcoin's core principle: decentralization, or the inability of any single company or consortium of mining pools to control the network.

It is important to recognize that this issue extends beyond the physical distribution of hardware—it is fundamentally an economic and software-level challenge. Effective mitigation will require a combination of protocol-level innovations and supportive regulatory or policy frameworks that promote decentralization, ensuring a more secure and resilient network for all participants over the long term.

Post-Quantum Era

Throughout 2025, active discussions have focused on the future of Bitcoin and the network's ability to withstand ultra-fast quantum computers, whose large-scale emergence is projected closer to 2032. The challenge lies in the fact that quantum computers can perform computations significantly faster than modern machines. This creates a potential risk: during a standard transaction, a quantum system could theoretically intercept it and compute a block faster than the network (i.e., in less than the standard 10 minutes), potentially allowing the asset to be redirected to another address.

However, the post-quantum era does not signal the end of Bitcoin—it represents another phase in its natural evolution.

The network preserves its foundational principles while upgrading its security mechanisms to operate safely in a world of quantum technologies. Bitcoin transitions to more resilient cryptographic methods: private keys remain secure through the replacement of legacy algorithms with post-

quantum cryptography, while Proof-of-Work can be adjusted if quantum machines gain a significant computational advantage.

This period accelerates the development of post-quantum security standards, not only for Bitcoin but across the broader blockchain ecosystem. There is increasing emphasis on adaptive protocols capable of responding to technological shifts in real time. The network gradually becomes more autonomous, where security is ensured not only by mining power but also by the robustness of cryptographic algorithms.

By 2032, the race for maximum hash rate begins to fade in importance. Two logical development paths emerge:

1. **Technological saturation**.

Hardware performance reaches its limits, making further increases in computational power impractical. Network scaling becomes possible only through expanding the number of mining units.

2. **Next-generation ASIC evolution**.

The emergence of hybrid ASIC systems incorporating quantum technologies.

Both paths converge toward the same outcome—reaching maximum computational capacity under conditions of high mining difficulty and significant energy consumption. During this phase, Bitcoin evolves into a self-sustaining digital ecosystem, capable of maintaining its own security and stability without reliance on continuous technological breakthroughs or additional issuance.

Post-Mining Era: Vision I

This vision reflects my subjective perspective, formed through analysis of the blockchain network and current data as of early 2026. At this stage, network growth is driven by miners' incentives to mine BTC for profit. This is logical within the current paradigm—mining remains economically viable and motivates participants to secure the network.

Ahead lies a series of halvings through 2140, when 100% of all Bitcoin will be mined. The key question is: what will incentivize miners when the

block reward declines significantly—for example, to 0.1 BTC? Based on current estimates, this could occur around 2060.

YEAR	BLOCK HEIGHT	REWARD	COINS ISSUED	TOTAL SUPPLY
2009	0	50.00000000	10,500,000.00000000	0%
2012	210,000	25.00000000	15,750,000.00000000	50.00000006%
2016	420,000	12.50000000	18,375,000.00000000	75.00000008%
2020	630,000	6.25000000	19,687,500.00000000	87.50000010%
2024	840,000	3.12500000	20,343,750.00000000	93.75000010%
2028	1,050,000	1.56250000	20,671,875.00000000	96.87500011%
2032	1,260,000	0.78125000	20,835,937.50000000	98.43750011%
2036	1,470,000	0.39062500	20,917,968.75000000	99.21875011%
2040	1,680,000	0.19531250	20,958,984.37500000	99.60937511%
2044	1,890,000	0.09765625	20,979,492.18750000	99.80468761%
2048	2,100,000	0.04882812	20,989,746.09270000	99.90234386%
2052	2,310,000	0.02441406	20,994,873.04530000	99.95117198%
2056	2,520,000	0.01220703	20,997,436.52160000	99.97558604%
2060	2,730,000	0.00610351	20,998,718.25870000	99.98779307%
2064	2,940,000	0.00305175	20,999,359.12620000	99.99389658%
2068	3,150,000	0.00152587	20,999,679.55890000	99.99694833%
2072	3,360,000	0.00076293	20,999,839.77420000	99.99847420%
2076	3,570,000	0.00038146	20,999,919.88080000	99.99923713%
2080	3,780,000	0.00019073	20,999,959.93410000	99.99961859%
2084	3,990,000	0.00009536	20,999,979.95970000	99.99980932%
2088	4,200,000	0.00004768	20,999,989.97250000	99.99990468%
2092	4,410,000	0.00002384	20,999,994.97890000	99.99995236%
2096	4,620,000	0.00001192	20,999,997.48210000	99.99997620%
2100	4,830,000	0.00000596	20,999,998.73370000	99.99998812%
2104	5,040,000	0.00000298	20,999,999.35950000	99.99999408%
2108	5,250,000	0.00000149	20,999,999.67240000	99.99999706%
2112	5,460,000	0.00000074	20,999,999.82780000	99.99999855%
2116	5,670,000	0.00000037	20,999,999.90550000	99.99999929%
2120	5,880,000	0.00000018	20,999,999.94330000	99.99999966%
2124	6,090,000	0.00000009	20,999,999.96220000	99.99999984%
2128	6,300,000	0.00000004	20,999,999.97060000	99.99999993%
2132	6,510,000	0.00000002	20,999,999.97480000	99.99999997%
2136	6,720,000	0.00000001	20,999,999.97690000	99.99999999%
2140	6,930,000	0.00000000	20,999,999.97690000	100.00000000%

Table: Sequence of Halvings and Reward Reduction | Period 2009–2140

It is reasonable to assume that BTC price appreciation into the millions of dollars could partially offset the reduction in block rewards, preserving mining's economic attractiveness.

This scenario appears to be the baseline for long-term network sustainability. At the same time, transaction fees will play a critical role. Miners are rewarded not only for block production but also for including transactions in blocks. This creates a persistent revenue stream

independent of issuance levels. As block subsidies decline, fees gradually become the primary economic incentive for maintaining network security. Their stability directly depends on network usage and demand for transaction settlement.

In this context, two primary development paths emerge:

1. The network evolves into a full-scale payment system for everyday use. The higher the transaction throughput, the more stable the network's economic model.
2. Transaction fees remain high and support miners even with lower transaction volume.

Evaluating the first scenario, one could assume that over time, 70–80% of Bitcoin will be held by institutions and sovereign entities. This mirrors the modern role of gold: historically used as a medium of exchange, yet today largely concentrated in funds and state reserves. Accordingly, even if Bitcoin becomes a widely adopted payment rail, this phase will likely be transitional—followed by asset redistribution toward large-scale holders.

The second scenario appears less sustainable. High fees constrain transaction volume and reduce accessibility for everyday use. In such a model, Bitcoin risks becoming a settlement layer for large or strategic transfers, which would reduce overall transaction count and, consequently, aggregate fee revenue.

In a situation where neither scenario fully aligns with the original vision, it is worth returning to Bitcoin's foundational concept. Its purpose extends beyond profit or technological advancement—it is about creating a decentralized monetary system without banks, governments, or intermediaries, restoring financial sovereignty to users.

For this reason, a third approach appears more holistic—a shift in the development paradigm. The network gradually transitions toward self-sufficiency, where the competition for hash rate loses its dominant significance. It moves toward energy equilibrium, with mining increasingly powered by renewable energy sources—wind, hydro, and solar.

At the threshold of the post-quantum era (around 2032), the share of clean energy could reach approximately 70%, and by 2060, approach near-

total energy autonomy. In this model, the network evolves into a self-sustaining system capable of maintaining its own security and stability without critical dependence on issuance or external factors.

Post-Mining Era: Vision II

This vision serves as an alternative to the first concept while offering a different lens through which to interpret the network's evolution. It does not claim absolute truth but instead opens the door to a deeper exploration of potential future scenarios.

When analyzing the history of the blockchain, an intriguing fact emerges: the earliest blocks in the network, as well as the addresses to which Satoshi Nakamoto received mining rewards, have remained untouched as of the end of 2025. These coins still reside at their original addresses—not a single BTC has been moved since the network's inception. According to researcher estimates, the volume of such assets is approximately 1,100,000 BTC.

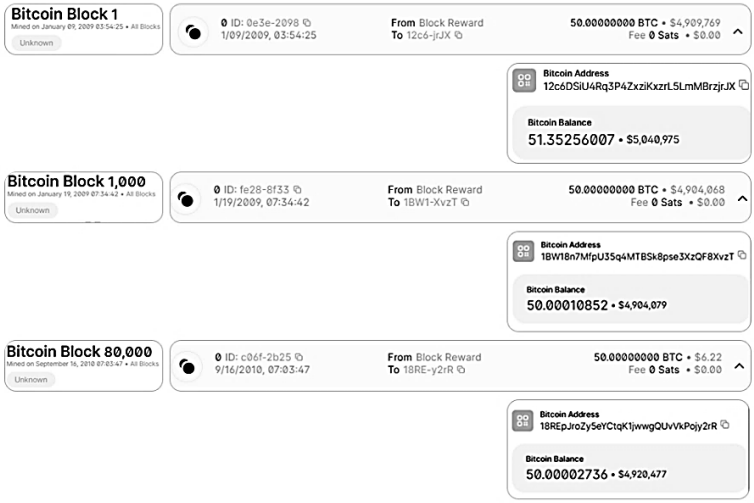


Chart: Bitcoin Network Data | Blockchain

This raises a logical question: why have these coins remained dormant? Part of the answer may be simple—some early miners may have lost access to their holdings or deliberately chosen not to use them. Such "dormant coins" are a well-documented phenomenon in the network's history.

However, given the scale—over 5% of total supply—this phenomenon invites two conceptual interpretations:

- **First Concept — "Insurance".**

In the early stages of Bitcoin's development, there was no certainty regarding the network's long-term viability. It is plausible that a portion of the initial mining output was intentionally left untouched as a strategic reserve. This reserve was not meant for active use but rather functioned as a stabilization buffer.

Even in a scenario where mining activity fully ceases, the protocol is capable of preserving integrity and consensus. The network can enter a *cold standby* mode and resume operations when new miners emerge. In this sense, dormant coins act not as profit-generating instruments but as a component of the system's long-term resilience.

Moreover, such a reserve indirectly limits excessive concentration of assets in the hands of individual actors and contributes to a more distributed allocation across network participants. It reinforces Bitcoin's scarcity in its early stages and helps establish a foundation for a stable economic model. In this light, dormant coins can be viewed as a strategic buffer that supports the network's autonomy and trust.

- **Second Concept — "Unpredictable Event".**

Let us consider an alternative, purely theoretical scenario. Under certain conditions, a group of large mining operators could concentrate more than 51% of the hash rate and attempt to initiate a protocol change via a hard fork.

The essence of such a scenario would involve revisiting the status of early "dormant" coins. In a modified version of the protocol, these assets could theoretically be reintroduced into circulation or redistributed among active network participants. In effect, this would represent a fundamental shift in the historically established economic model.

However, the implementation of such a scenario is not possible through miners alone. It would require broad consensus among all key stakeholders: node operators, exchanges, wallet providers, and users. Without such alignment, the network would inevitably split into two

independent chains—similar to the events of 2017, when Bitcoin Cash was created.

At the same time, this scenario remains purely theoretical and primarily illustrates the boundaries of what is technically possible within the Bitcoin system. In practice, such actions would contradict the network's core principles—immutability of rules, predictability of issuance, and decentralization. Any attempt to "unfreeze" these coins would undermine trust in the system and could trigger internal destabilization.

The key takeaway is that, in the future, conditions or initiatives may emerge from leading participants in the crypto industry to revisit the status of legacy dormant supply. However, it is essential to understand: these coins must neither be burned nor restricted—they should remain untouched, in a state of permanent immutability where no entity can exert influence over them over time.

This very factor may represent a kind of "Achilles' heel" of the network—one that simultaneously anchors its foundation and safeguards its core principles. On one hand, it is a potential point of tension for future decision-making on the other, it is a critical pillar of trust in the system. The immutability of these assets underpins the long-term predictability and stability of Bitcoin's economic model. Any interference with this balance could have systemic consequences for the entire ecosystem.

Potential Shift in Cyclical Behavior

Historically, the network has gone through its first *tri-cycle*—an approximately 12-year period during which Bitcoin exhibited clear cyclical behavior. Each cycle followed a similar structure: bottom formation, a new all-time high, and recurring market fluctuations.

In my view, a new tricycle began in 2022. Despite ongoing debates about the breakdown of the traditional four-year cycle model, data as of the end of 2025 indicates that the core patterns remain intact.

Key elements of previous cycles are repeating:

- A bottom formed around the $16,000 level
- The previous all-time high of ~$68,000 was surpassed

- A new peak was established near $126,000
- Volatility remains within typical ranges: −25% to −35% mid-cycle, and over −50% during final correction phases.

Even so, a significant portion of market participants believes the cycle has fundamentally changed. In my view, this is more illusion than reality. This perception coincided with the entry of large institutional players, the launch of ETFs in the U.S. and Europe, the growth of derivatives markets, and Bitcoin's integration into hedging strategies. These developments create the impression of a "maturing" market—but they do not alter its underlying mechanics.

In practice, the core dynamics remain unchanged: bottom formation, breakout above the previous high, establishment of a new peak, followed by characteristic corrections. Even in peak phases, typical drawdowns persist—reaching as much as −65% to −75%.

At the same time, over the long term, the structure of cycles may indeed evolve—but due to internal factors. In a self-sustaining network phase—where issuance becomes negligible, transaction fees dominate miner revenue, and global integration reaches its peak—market behavior may shift away from four-year cycles toward smoother, more extended waves. These cycles could lengthen to 6–8 or even 8–12 years, with reduced volatility and greater predictability.

The Remote Resource Concept

A simple economic example helps explain the pattern of lengthening cycles—driven primarily by the network's internal mechanics rather than external factors such as the entry of institutional players or the launch of ETFs.

Imagine a small farm that produces apple juice. Nearby are apple orchards, and at first the closest one is right next door. The farmer can harvest quickly and at minimal cost, maintaining stable production.

Over time, the nearest orchard becomes depleted and no longer yields as it once did. The farmer is forced to move to more distant orchards. With each new source, the distance increases, logistics become more complex, and costs

rise. To maintain the same level of production, more time and resources are required—naturally extending the production cycle. This is a fundamental principle: the farther away the resource, the greater the effort needed to access it.

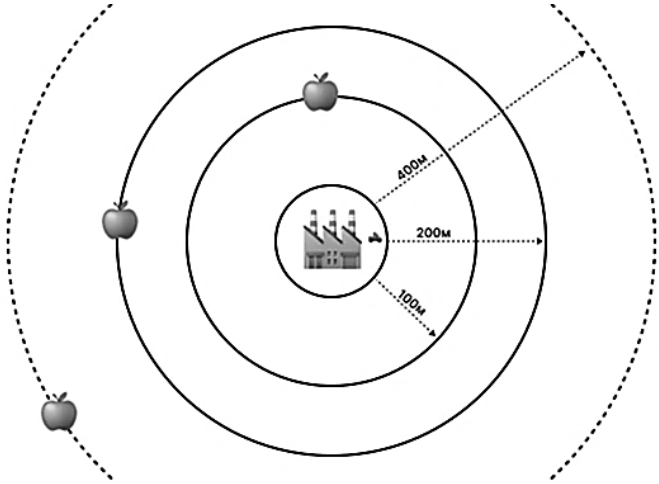


Illustration: Visualization of a remote resource source

Now imagine the farmer upgrades logistics and begins using high-speed electric trucks. Transportation costs decrease, and access to remote orchards becomes more efficient. As a result, the cycle duration shortens—technology compensates for increasing distance.

In this analogy, the apple orchards represent Bitcoin, the farm represents mining operators, and juice production represents the mining process powered by ASIC hardware. The lengthening of cycles is determined by the system's internal structure and the finite nature of the resource, while technology can partially offset this effect.

The economic logic is straightforward: as the block reward declines (due to halving), the relative "distance" to the resource increases. Achieving the same level of profitability requires more time and higher costs. As a result, mining operators need longer to cover expenses and reach profitability, which directly extends market cycles.

At the same time, it's important to clarify: the network's core rules remain unchanged, but its economic dynamics are shaped by the interaction of code, market forces, and technology. It is this interplay that defines the rhythm of development—one that may evolve over time while preserving the system's fundamental principles.

Economic Model of Cycle Extension

To assess the impact of the 2024 halving on market cycle duration, averaged energy efficiency and *energy-cost* metrics from five public mining companies (including Riot, IREN, and Canaan) for 2025 were used. The *energy-cost* metric is selected as the baseline because it directly reflects the speed of miners' technological adaptation following a reduction in block rewards.

The increase in cost per unit of mined output after the halving places additional pressure on operational efficiency, forcing companies to optimize hardware and energy consumption. This leads to a gradual normalization of profitability but at the same time extends the recovery period following market downturns. As a result, a structural trend toward longer cycles emerges, as the market requires more time to reach a new equilibrium between costs, price, and hash rate.

- **Cycle Extension Coefficient**

A Bitcoin halving is an event in which the reward for mining a block is reduced by half. At the same time, a miner's core expenses—electricity, hardware, cooling, labor, and infrastructure—do not automatically decrease.

Before the halving, a miner receives the full block reward and, within an approximately four-year cycle, can invest in equipment, cover operating expenses, and recoup invested capital. After the halving, revenue generated from the same computational power drops by 50%, while costs remain largely unchanged, directly impacting mining economics.

PARAMETER	PREVIOUS	CURRENT	HALVING COEFFICIENT
Block Reward	6.25 BTC	3.125 BTC	$K_{halving} = \frac{6.25}{3.125} = \mathbf{2}$

Table: Determining the Halving Coefficient (Base Extension Factor)

Under conditions of relatively stable network difficulty and unchanged costs, this implies that achieving the same cumulative revenue requires approximately twice as much time. Accordingly, the payback cycle shifts: a nominal four-year pre-halving period transforms into roughly eight years post-halving.

This effect establishes the base cycle extension coefficient, reflecting a slowdown in capital turnover within the system. As a result, the market requires more time to restore profitability and generate new investment waves, directly extending market cycles. It also reduces the velocity of new capital inflows into the industry, as the investment payback period becomes longer and less predictable.

- **Cost Compensation**

We have established that, under unchanged cost conditions, a halving event effectively doubles the payback cycle. The only economically sound way to partially offset this effect is by reducing the cost of mining one BTC. This is achieved primarily through upgrading the mining fleet to next-generation ASIC hardware. Modern machines offer higher energy efficiency, meaning they generate more hash rate per unit of electricity consumed. At equal energy prices, this translates into a lower cost per hash and, consequently, a lower cost per coin.

An additional effect is achieved through operational optimization:

- improving cooling systems and stabilizing load management
- relocating capacity to regions with lower electricity costs

Together, these measures increase the marginal profitability of each unit of hash rate, even as block rewards decline.

Comparative Data (2025 Period):

PARAMETER	DATA (Q1)	DATA (Q3)	COST COEFFICIENT
Mining Cost (USD) *(average)*	$50,000	$36,000	$K_{cost} = \frac{50{,}000}{36{,}000} = \mathbf{1.39}$
Mining Cost (USD) *(new hardware)*		$28,500	$K_{cost} = \frac{50{,}000}{28{,}500} = \mathbf{1.93}$

Table: Cost Compensation Model Through Technological Upgrades

These figures illustrate the impact of technological upgrades. The first case reflects the average reduction in mining costs across the market, while the second demonstrates the result of deploying new ASIC units. The cost coefficient shows how many times the cost of mining one BTC decreases—the higher the value, the more efficiently the miner operates after modernization. In essence, it serves as an indicator of the speed of adaptation to post-halving conditions.

However, it is important to recognize the limits of this effect. Even with aggressive technological upgrades, the halving cannot be fully offset for all market participants. The reason lies in the uneven pace of equipment modernization—different companies have varying levels of access to capital, infrastructure, and energy resources.

The second table demonstrates how technological efficiency directly impacts cycle extension.

PARAMETER	$K_{halving}$	K_{cost}	RESIDUAL COEFFICIENT
Cycle Extension Coefficient *(average)*	2	1.39	$K_{\text{residual}} = \frac{2}{1.39} = \mathbf{1.44}$
Cycle Extension Coefficient *(new hardware)*	2	1.93	$K_{\text{residual}} = \frac{2}{1.93} = \mathbf{1.04}$

Table: Residual Effect Model

In the base case (without upgrades), the extension coefficient equals 2. Through cost reduction, it decreases to 1.44 for the average market and is nearly neutralized (1.04) for new-generation hardware. This indicates that modern mining systems can almost fully offset the halving effect, whereas outdated equipment retains a significant share of the residual extension coefficient (K_ residual).

The reduction of this coefficient is directly dependent on the share of next-generation ASICs within the total hash rate structure. The greater this share, the more effectively a miner can mitigate the impact of the halving. For participants operating with obsolete hardware, the extension of the payback cycle remains nearly complete, which naturally leads to their gradual displacement from the market.

- **Determining Cycle Extension**

The previously derived coefficients allow us to estimate the projected extension of the market cycle in time terms. The calculation is based on an 18-month post-halving period—the phase of most intensive adaptation within the mining industry. This is when large-scale ASIC fleet upgrades occur, energy consumption is optimized, and hash rate redistributes toward more efficient operators. Until the end of this phase, most miners operate with elevated costs, meaning the halving effect is at its peak. After 18 months, technological adaptation gradually reduces costs, and the economic impact of the halving weakens—making it inaccurate to apply the extension coefficient to the entire cycle.

PARAMETER	ADAPTATION (months)	K_{residual}	ADAPTATION DURATION (months)
Cycle Extension *(average)*	18	1.44	$\boldsymbol{T_{cycle}} = 18\ x\ 1.44 = \mathbf{25.9}$ $\boldsymbol{N_{cycle}} = 25.9 - 18 = \mathbf{7.9}$
Cycle Extension *(new hardware)*	18	1.04	$\boldsymbol{T_{cycle}} = 18\ x\ 1.04 = \mathbf{18.7}$ $\boldsymbol{N_{cycle}} = 18.7 - 18 = \mathbf{0.7}$

Table: Adaptation Period Extension Model

Using averaged market indicators, approximately 44% of the net extension effect remains embedded in the cost structure. For miners operating next-generation ASICs, this figure drops to around 4%, effectively neutralizing the impact of the halving.

The table clearly shows how the residual cycle extension coefficient (K_ residual) influences the duration of the network's adaptation period. In the average scenario, the cycle extends to approximately 25.9 months—an increase of 7.9 months over the baseline 18-month adaptation phase. For miners utilizing new ASIC hardware, this effect is nearly eliminated: the period reaches approximately 18.7 months, indicating that higher technological efficiency can almost fully offset the economic impact of the halving.

The next table represents the final stage of the calculations and shows how the residual extension effect translates into the full duration of the market cycle.

PARAMETER	FULL CYCLE (months)	VALUE (months / years)
Total Duration *(average)*	48	$C_{\mathrm{M}} = 48 + 7.9 = \mathbf{55.9}$ months $C_{\mathrm{P}} = 55.9 / 12 = \mathbf{4.66}$ years
Total Duration *(new hardware)*	48	$C_{\mathrm{M}} = 48 + 0.7 = \mathbf{48.7}$ months $C_{\mathrm{P}} = 48.7 / 12 = \mathbf{4.06}$ years

Table: Full Cycle Duration Calculation

As a result, the table clearly illustrates a key idea: the halving affects all participants equally at the protocol level, but its economic consequences depend on technological efficiency. The more advanced the hardware, the closer the cycle remains to the classic four-year model, whereas for the average market, the cycle extends noticeably.

- **Mining Profitability**

Based on publicly available, averaged *energy cost* data from five mining companies, we can trace how mining economics evolve in the post-halving period. These figures highlight the key relationship between the cost of production and the market price of BTC—directly determining miner profitability and shaping market behavior.

In the first months after the halving, this balance is under maximum pressure. The reduction in block rewards immediately impacts revenue, while costs require time to adjust. This makes the initial post-halving phase a critical inflection point where a new economic equilibrium begins to form within the network.

Immediately after the halving (Q1 2025), the average energy cost of mining one BTC was approximately $50,000, with a market price around $60,000. Under these conditions, mining margins stood at about 16.7%, effectively placing a large portion of market participants in survival mode.

PERIOD	ENERGY COST	PRICE
Post-halving phase (**Q1 2025**)	$50,000	$60,000
Post-halving phase *(new hardware* (**Q3 2025**)	$36,000	$111,500
PROFITABILITY FORMULA		
	$\boldsymbol{Margin} = \left(\frac{\boldsymbol{Price} - \boldsymbol{EnergyCost}}{\boldsymbol{Price}}\right) \boldsymbol{x\ 100}$	
Margin (**Q1 2025**)	**16.7%**	$\left(\frac{60{,}000 - 50{,}000}{60{,}000}\right) x\ 100$
Margin (**Q3 2025**)	**67.6%**	$\left(\frac{111{,}500 - 36{,}000}{111{,}500}\right) x\ 100$

Table: Post-Halving Mining Economics | Next-Generation ASIC

During this period, miners operating with outdated hardware or high operating costs were at or below breakeven, while companies with upgraded ASIC fleets maintained a limited but stable edge. Mining in this phase functioned more as operational support rather than profit generation, with most companies refraining from actively selling mined BTC.

Approaching the 18-month mark after the halving (Q3 2025), the situation shifts dramatically. The combination of technological adaptation (reducing energy cost to approximately $36,000) and a rise in BTC price to around $111,500 leads to a sharp expansion in margins—up to roughly 67.6%. This represents an increase of more than 50 percentage points and an approximate fourfold relative growth in margin.

This dynamic is typical of the network transitioning from the adaptation phase into a high-profitability phase. Reaching margin levels near 50% becomes both a psychological and financial threshold, after which mining companies begin partial profit-taking. At this point, BTC supply from miners increases, historically correlating with higher market volatility.

At the same time, the optimal realization range for mined coins among efficient operators shifts into the +30–50% band above production cost. Within this range, miners achieve a balance between profit-taking and preserving upside potential.

In this way, margin reflects the deeper structural dynamics of the network—from a period of stress and consolidation following the halving to a profitability phase in which miners once again become active liquidity suppliers to the market. This transition often defines the pace and limits of the next stage of the market cycle.

Mining Cost Dynamics in the 2024–2028 Cycle

To better understand the economics of Bitcoin mining within the current cycle, it should be viewed as a dynamic system where not only the halving plays a key role but also the cumulative effect of increasing network difficulty. It is the combination of these factors that shapes the long-term trajectory of production costs and ultimately determines the profitability of mining operators.

The cost of mining BTC is an integrated metric that reflects the efficiency of the entire infrastructure—from the quality of hardware to energy pricing and the level of competition within the network. At the same time, mining difficulty acts as the primary driver of cost growth, as its increase directly raises the amount of computational work required to earn the same block reward.

- **Weighted Average Scenario (Base Market)**

This scenario assumes an average network difficulty growth rate of approximately 7.5% per quarter, reflecting the current trajectory of industry development.

PARAMETER	PRE (Q4 2025)	HALVING (Q1 2028)	POST HALVING (Q1 2028)
Average quarterly difficulty growth	-	7.5%	-
Number of growth quarters	-	9	9
Mining difficulty doubling (halving effect)	-	-	100%
Average mining cost per BTC (USD)	$39,500	$75,500	$151,000
MINING COST CALCULATION			
Before halving::		**After halving (2028)**:	
39,500 × (1+0.075)^9 ≈ **75,731**		39,500 × ((1+0.075)^9) × 2 ≈ **151,462**	

Table: Forecast of Bitcoin Mining Cost Dynamics in a Weighted Scenario (2025–2028)

The table illustrates how gradual growth in network difficulty over nine quarters (up to the 2028 halving) nearly doubles mining costs—from approximately $39.5K to around $75.5K. This is the result of a compounding effect, where each successive increase builds on the previous one.

After the halving, a further structural shift occurs due to the block reward being cut in half, effectively raising the cost of producing one BTC to approximately $151K. In this sense, the halving does not generate costs on its own—it amplifies the already accumulated effect of rising network difficulty.

Under this base scenario, a new economic equilibrium emerges, where mining profitability becomes directly dependent on the market's ability to sustain prices above $150,000 in the next cycle.

- **Conservative Scenario (Slower Growth)**

This scenario assumes a more moderate network difficulty growth rate of approximately 5% per quarter, which could occur in the event of slower industry expansion or constraints in access to energy resources.

PARAMETER	PRE (Q4 2025)	PRE HALVING (Q1 2028)	POST HALVING (Q1 2028)
Average quarterly difficulty growth	-	5.0%	-
Average mining cost per BTC (USD)	$39,500	$61,000	$122,500
MINING COST CALCULATION			
Before halving:: 39,500 × (1+0.05)^9 ≈ **61,277**		**After halving (2028):** 39,500 × ((1+0.05)^9) × 2 ≈ **122,554**	

Table: Forecast of Bitcoin Mining Cost Dynamics in a Conservative Scenario (2025–2028)

Under these conditions, pre-halving mining costs rise to approximately $61K, which is significantly lower than in the base scenario. After the halving, costs double to around $122.5K, establishing a more moderate entry threshold for miners.

This clearly shows that even under relatively weak difficulty growth, the compounding effect remains the dominant force, but its magnitude is more controlled. This creates a more predictable economic environment,

where profitability swings are less extreme and risk is more manageable for most market participants.

As a result, this scenario is the most favorable for a broader set of miners, as it reduces pressure on margins and slows the rate at which less efficient operators are pushed out of the market.

- **Aggressive Scenario (Accelerated Growth)**

This case assumes rapid network difficulty growth at approximately 10% per quarter, potentially driven by a massive inflow of institutional capital and rapid infrastructure expansion.

PARAMETER	PRE (Q4 2025)	PRE HALVING (Q1 2028)	POST HALVING (Q1 2028)
Average quarterly difficulty growth	-	10.0%	-
Average mining cost per BTC (USD)	$39500	$93,000	$186,000
MINING COST CALCULATION			
Before halving: 39,500 × (1+0.10)^9 ≈ **93,138**		**After halving (2028):** 39,500 × ((1+0.10)^9) × 2 ≈ **186,277**	

Table: Forecast of Bitcoin Mining Cost Dynamics in an Aggressive Scenario (2025–2028)

In this scenario, pre-halving mining costs reach approximately $93K, while post-halving costs surge to around $186K. This is more than four times the initial level, creating an extremely high profitability threshold.

This outcome demonstrates the power of exponential growth: even a relatively small difference in growth rate (10% vs. 7.5%) leads to dramatically different long-term results. The aggressive scenario creates a highly competitive environment where only the most technologically efficient and well-capitalized players can survive.

** In compound growth calculations of mining cost, the (^n) exponential factor is used.*

All three scenarios illustrate the same fundamental principle: the primary driver of mining cost growth is not the halving itself but the cumulative increase in network difficulty. In this model, the halving acts as a catalyst that instantly doubles already accumulated costs, shifting the system into a new economic state.

The faster difficulty grows throughout the cycle, the higher the post-halving profitability threshold becomes. As a result, the market naturally moves toward consolidation, where less efficient participants are gradually forced out while the share of large-scale mining operators increases.
Ultimately, in the long term, it is technological efficiency, access to low-cost energy, and the speed of adaptation that determine not only survival but also the ability to shape the structure of the next market cycle.

Mining Margin Dynamics in the 2024–2028 Cycles

In the post-halving 2028 environment, the mining industry enters a phase of heightened sensitivity to hardware efficiency and the structure of operational costs. To quantify this effect, a model is constructed that illustrates changes in miner profitability across ASIC generations under different market scenarios—both before and after the 2028 halving.

- **Margin (excluding capital expenditures)**

EQUIPMENT CATEGORY	NETWORK SHARE	ENERGY COST ($/ BTC)		MARGIN CALCULATION AT BTC PRICE			
		Pre-halving Q1 2028	Post-halving Q1 2028	$150K BTC		$200K BTC	
				Pre-halving	Post-halving	Pre-halving	Post-halving
Top tier: S25 (8-10J/TH)	~40%	46,500	56,000	222%	167%	330%	257%
Mid tier : S23+ (9-12J/TH)	~40%	52,000	105,000	188%	43%	284%	90%
Mid tier : S23 (9-12J/TH)		82,000	164,000	83%	-8.5%	144%	22%
Low tier : S21 (12-15J/TH)	~20%	172,100	344,500	-12,3%	-55%	16%	-42%
Network average	-	88,150	167,300	70%	-10%	127%	20%

Table: Forecast of Bitcoin Mining Margin Dynamics in the 2028 Period | Energy Cost

The table presents mining profitability based on energy costs (energy cost), excluding capital expenditures, allowing for a clear view of operational efficiency across different hardware generations under baseline price scenarios.

In the top-tier segment (S25, 8–10 J/TH), production costs remain the lowest—approximately $46.5K pre-halving and $56K post-halving—resulting in margins of up to ~330% at a BTC price of ~$200K. This positions this category as the dominant force within the network.

The S23+ segment shows a noticeable compression in margins but remains largely profitable (~90% at $200K BTC), while S23 and S21 progressively move into unprofitable territory, creating structural pressure for their displacement from total hash rate contribution.

On a network-wide average, post-halving margins decline to approximately -10%, a condition that typically triggers a "cleansing phase" in the mining industry. This phase is characterized by the exit of inefficient operators and a subsequent transition toward dominance by next-generation hardware, resetting the competitive structure of the network.

- **Margin Including Capital Expenditures**

Including capital expenditures (hardware cost) allows for a more realistic assessment of miners' financial resilience, as it captures not only operational expenses but also upfront investment in equipment. Unlike pure energy-based margin, this approach reflects the full cost structure and enables a more accurate comparison across different generations of mining hardware. It also provides a more precise model of miner behavior across different phases of the market cycle—especially after halvings, when reduced block rewards intensify competition within the network. In such conditions, hardware efficiency and cost structure become the key determinants of survival.

Before building the model, it is useful to define the baseline cost structure of mining operations. The balance between energy expenses and capital expenditures forms the economic profile of each hardware generation and determines its sensitivity to changing market conditions.

The table below illustrates a typical distribution of costs between *energy cost* and *hardware cost* across major categories of mining equipment.

EQUIPMENT CATEGORY	ENERGY COST SHARE	HARDWARE COST SHARE	TOTAL COSTS
Top tier: S25	35%	65%	100%
Mid tier: S23+	45%	55%	
Mid tier: S23	45%	55%	
Low tier: S21	55%	45%	
Network average	45%	55%	

Table: Cost Structure in Mining

The table above presents miner profitability when capital expenditures (hardware cost) are included, allowing for a comprehensive evaluation of profitability across different price scenarios before and after the halving.

EQUIPMENT CATEGORY	COST SHARE	HARDWARE COST ($/ BTC)		MARGIN CALCULATION AT BTC PRICE			
		Pre-halving Q1 2028	Post-halving Q1 2028	$150K BTC		$200K BTC	
				Pre-halving	Post-halving	Pre-halving	Post-halving
Top tier: S25 (8-10J/TH)	~65%	132,500	160,000	13.2%	-6.3%	50.9%	25%
Mid tier : S23+ (9-12J/TH)	~55%	115,500	233,000	29.8%	-35.6%	73.2%	-14.3%
Mid tier : S23 (9-12J/TH)		182,000	364,000	-17.5%	-58.8%	9.8%	-45%
Low tier : S21 (12-15J/TH)	~45%	312,500	626,500	-52%	-76%	-36%	-68%
Network average	55%	185,600	345,800	-19%	-56.6%	7.7%	-42%

Table: Forecast of Bitcoin Mining Margin Dynamics in the 2028 Period | Hardware Cost

In the top-tier S25 segment (8–10 J/TH), despite a high capital cost share (~65%), units maintain a positive margin (~13.2%) only before the halving

at a BTC price of $150K, while at $200K they remain solidly profitable. This confirms their ability to maintain dominance in the network even under rising cost pressure.

The S23+ segment shows a mixed profile: relatively strong profitability before the halving (~29.8%) but a transition into negative territory after (~-35.6%) at $150K BTC, indicating reduced economic resilience. However, at higher price levels ($200K), these units can still maintain limited profitability.

The S23 and S21 models are structurally unprofitable in most scenarios. Even before the halving, their margins are negative or near zero, and they deteriorate significantly afterward, creating clear conditions for gradual displacement from the hash rate.

On a network-wide average, including capital expenditures pushes profitability into negative territory (~-19%) at $150K BTC even before the halving. This reflects a typical cycle phase—market rebalancing. During this period, inefficient hardware exits the system, while hash rate becomes increasingly concentrated in the hands of next-generation, more efficient operators. This also explains why both hash rate and overall network difficulty often decline during correction phases.

A key point requires clarification to correctly interpret the model: why do S25 units show a higher hardware cost than S23+?

1. **Cost of next-generation equipment**.

S25 units require significantly higher upfront capital investment, which is directly reflected in their higher calculated hardware cost. As a next-generation ASIC class, they carry a price premium driven by improved energy efficiency, higher hash density, and overall technological advancement.

2. **Depreciation effects (amortization structure)**.

S23+ units are partially or fully depreciated. A substantial portion of their initial acquisition cost was already absorbed in previous accounting periods, which means their remaining economic or book hardware cost is significantly lower.

As a result, older S23+ machines can appear “cheaper” on a hardware cost-per-BTC basis, even though they are less efficient and closer to economic obsolescence.

Within the 2024–2028 cycle framework, the model captures mining margin dynamics through two key components: *energy cost* and *hardware cost*. These parameters determine the actual profitability of each hardware category under different price environments.

This framework is representative for future cycles as well. It enables the identification of realistic profitability ranges and supports more structured analytical decision-making. Particular attention should be given to the 30–50% margin range, as this is historically the zone where miners begin active profit realization. This behavior often becomes a key driver of liquidity flows and, in turn, plays a meaningful role in shaping broader market cycle dynamics.

Tricyclic Concept of Bitcoin Network Development

This section reflects my personal perspective on the evolution of the mining network. It is based on many years of research into blockchain ecosystems, analysis of previous cycles, and historical transformations in hash rate structure and mining economics.

The observations and patterns derived from this analysis are integrated into a system of knowledge that develops in close synchronization with the network itself. This approach makes it possible not only to describe changes after they occur but also to interpret them as part of a larger, repeating evolutionary process.

Tricycle I—Phase of Emergence and Formation (2009–2021)

- **Genesis (2009–2013) – Key Events:**
  - Launch of the network by Satoshi Nakamoto and creation of the genesis block
  - Emergence of early enthusiasts running mining nodes
  - Absence of a clear economic function: Bitcoin was not yet widely used as a medium of exchange
  - Execution of the first public transaction

Cycle outcome: The world's first decentralized digital asset was created, laying the foundation for a new economic paradigm.

- **First Development Stage (2013–2017) – Key Events:**
  - The first exchanges appear, forming an initial BTC market
  - Early understanding of Bitcoin's market dynamics begins to emerge
  - Major technological breakthrough: the introduction of ASIC mining hardware
  - Mining transforms into a fully fledged industrial sector
  - Businesses and early investors begin to recognize Bitcoin as a valuable asset

Cycle outcome: Bitcoin transitions from an experimental project into an emerging technological industry.

- **Global Recognition (2017–2021) – Key Events:**
  - Increasing accumulation of Bitcoin by companies and institutional funds
  - Governments begin to explore regulation and strategic implications
  - Launch of early Bitcoin futures and ETF-related instruments
  - Gradual integration of Bitcoin into the global financial system transaction

Cycle outcome: The first meaningful steps toward global adoption and institutionalization begin.

Tricycle II—Phase of Network Balancing and Asset Maturity (2021–2033)

- **Mass Adoption (2021–2025) – Key Events:**
  - Launch of spot Bitcoin ETFs
  - Institutional investors significantly increase BTC allocations
  - Governments begin forming official Bitcoin reserves
  - Mining becomes a core mechanism for network operation and security

Cycle outcome: Bitcoin establishes itself as a fully fledged financial and investment instrument.

- **Stabilization and Consolidation (2025–2029) – Key Events:**
  - Governments diversify reserves, treating Bitcoin alongside gold
  - Funds and institutions increase BTC allocation to 8–10% of portfolios
  - Pension funds begin long-term Bitcoin investments
  - Businesses widely integrate Bitcoin into operations and payment

Cycle outcome: A period of deep integration into financial, governmental, and commercial systems.

- **Emergence of a New Paradigm (2029–2033) – Key Events:**
  - Miner rewards fall below 1 BTC per block
  - Mining operators optimize for efficiency and cost reduction
  - Rapid growth in renewable energy usage for mining
  - Transition toward a fee-based mining economy
  - Mining evolves into an energy infrastructure component, balancing global grid

Cycle outcome: Mining becomes integrated with energy systems, enhancing network resilience and efficiency.

Tricycle III—Phase of Autonomy and Self-Regulation (2033–2045)

- **Transition to a New Paradigm (2033–2037) – Key Events:**
  - Transaction fees surpass block rewards as the primary miner revenue source
  - Mining becomes fully integrated into global energy infrastructure
  - Excess energy is increasingly directed toward mining for grid stabilization

Cycle outcome: Bitcoin becomes a mature, stable financial and investment system supported by global energy infrastructure.

- **Global Integration (2037–2041) – Key Events:**
  - Development of decentralized energy grids
  - Completion of most global mining and data infrastructure
  - Bitcoin emerges as a medium for global energy exchange

Cycle outcome: Bitcoin evolves beyond a monetary asset into a global energy-financial interface, where energy and BTC become a mutually convertible system.

- **Autonomy and Systemic Energy Unity (2041–2045) – Key Events:**
  - Hash rate becomes decoupled from profitability and functions as infrastructure
  - The network operates as a global mechanism for distributing energy and value flows
  - Financial and technological systems merge into a unified structure

Cycle outcome: Bitcoin becomes a fully self-regulating system where fees, energy, and decentralization operate in a unified loop, sustained by code and renewable energy without external intervention.

Macro Structure of Evolution

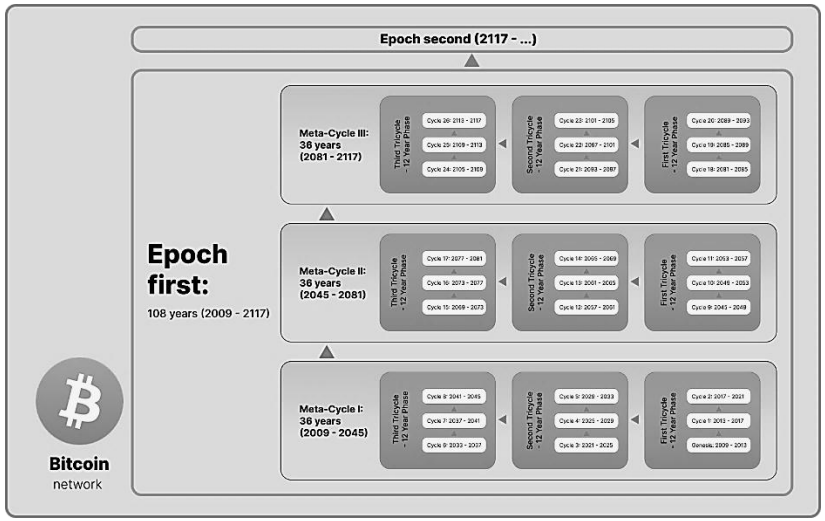


Chart: Concept of the Tricyclic Development of the Bitcoin Network

Across these three tricycles, the network evolves through:

- **Emergence** → discovery of a new digital economic primitive
- **Maturity** → balance, institutional recognition, and systemic adoption
- **Autonomy** → self-regulation and integration into global energy infrastructure

Together, these tricycles form the completion of the first meta-cycle of Bitcoin's development and open the transition into the second meta-cycle.

Within this framework, transition points are the most critical elements—both between tricycles and between meta-cycles. These phases act as structural shifts where the role of the network, its operational logic, and its perceived value fundamentally change. The higher the hierarchical level of transition, the deeper and more systemic the transformation.

To better understand Bitcoin's future, its nature, and its developmental rhythm, the most valuable source remains the blockchain itself. It is within network data that all key processes, relationships, and structural patterns are permanently recorded—allowing us to understand not only *what* Bitcoin becomes but also *why* it evolves in exactly this way.

Part II: Ethereum

It has been more than 14 years since the emergence of the first alternative digital asset. Over that time, nearly everything has changed: blockchain architectures, programming languages, validation methods, and consensus mechanisms. Entire verticals within digital assets have taken shape—from infrastructure platforms to DeFi, NFTs, and tokenized real-world assets (RWA).

However, the most significant shift has not been technological evolution alone but the natural maturation of the ecosystem. In the early days, alternative assets were largely forks or modifications of Bitcoin's source code, often with minimal differentiation. Over time, they evolved into fully structured projects—designed not merely to exist "in code," but to interact with the real world, economic models, incentive structures, and users.

Each cycle of this market acted as a filter, clearing out unsustainable solutions and leaving behind only those projects that withstood technological, economic, and social stress tests. Through repeated "resets"—mergers, bankruptcies, relaunches, and the gradual strengthening of standards—only those systems that endured a long and complex evolutionary path have survived to the present day.

As a result, modern digital assets are not just variations of cryptocurrencies they are the outcome of years of selection, adaptation, and technological integration—systems that have proven their resilience in real-world conditions. From today's historical vantage point, these projects can be viewed as "raw resources"—formed but not yet fully extracted. They contain intrinsic value, yet require time, practical application, and interaction with real-world environments to reach their final form and maturity.

We are now at a moment where these resources are already accessible: they can be analyzed, interpreted, developed, and invested in. Time, market maturity, and future cycles of evolution will ultimately "refine" them—transforming latent potential into fully realized systems capable of reshaping economic and infrastructure paradigms.

The Role of Ethereum as the Foundation of the Digital Economy

For a long time, debates persisted among digital asset advocates regarding the place and role of the Ethereum network within the broader crypto ecosystem. These discussions intensified as Bitcoin established itself as the dominant digital asset and a store of value. Yet the true significance of Ethereum became evident even before Ether and Bitcoin achieved widespread adoption.

The first key phase of development was marked by the emergence of foundational projects built on Ethereum: Uniswap, MakerDAO, Aave, Lido, Arbitrum, and Chainlink. These initiatives addressed critical sectors—liquidity, stablecoins, lending, staking, oracles, and Layer 2 infrastructure. Together, they defined the core landscape of decentralized finance and introduced entirely new categories of financial instruments, laying the groundwork for a robust and scalable blockchain ecosystem. This phase effectively completed the first layer of DeFi development—the foundational infrastructure.

Multi-Layered Interaction Between DeFi and TradeFi

The next logical stage was the emergence of segments that began leveraging this infrastructure. This interaction gave rise to two distinct financial models:

1. **DeFi** — a blockchain-native ecosystem capable of operating with digital instruments in a fully permissionless environment.
2. **TradeFi** — the traditional financial system, historically built around physical assets and fiat-based infrastructure.

Within this new paradigm, TradeFi cannot directly utilize decentralized tools. Instead, it interacts with blockchain systems indirectly, serving as a source of real-world liquidity from the legacy financial system. In doing so, it functions as a bridge between traditional capital and digital assets—enabling integration and interoperability between the two worlds.

The Process of Digitizing Real-World Assets: The Formation of RWA

It is precisely the interaction between DeFi and TradeFi that laid the groundwork for the emergence of the third layer—**RWA (Real World Assets)**. Its core objective is to bring traditional financial assets into the digital domain and integrate them into blockchain infrastructure.

RWA enables the tokenization of assets such as equities, treasury and corporate bonds, debt instruments, private credit, and commodities. This creates full convergence between traditional and digital markets, unlocking the ability to deploy real-world assets within DeFi mechanisms—enhancing liquidity, expanding collateral options, and enabling new yield strategies.

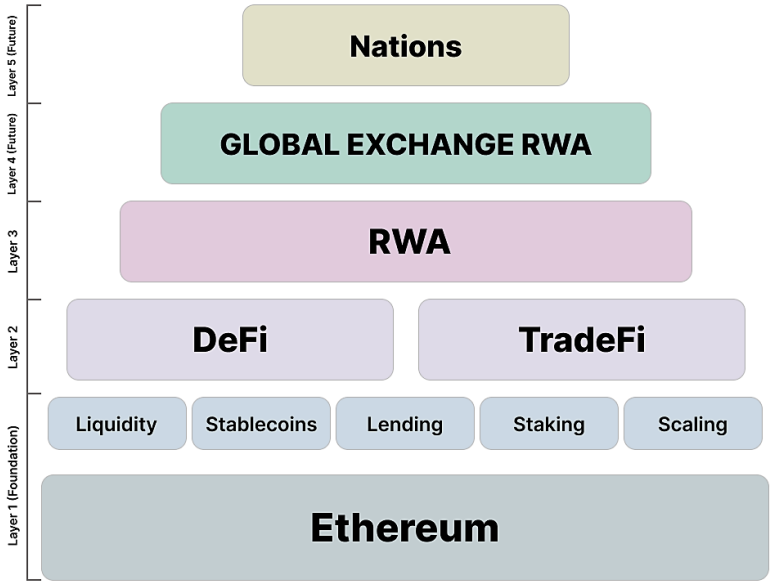


Chart: The Concept of a Digital Economy Built on Ethereum

In my view, this transformation will be largely completed by 2029, forming four foundational layers of the digital economy:

1. **Ethereum + DeFi** — infrastructure and next-generation financial instruments.

2. **DeFi + TradeFi**—interaction between legacy finance and blockchain-based systems.
3. **RWA**—digitization and tokenization of real-world assets.
4. **Decentralized asset exchange markets**—open, permissionless marketplaces for global asset liquidity and price discovery.

Vision for Future Development

A likely fourth layer will be the emergence of global decentralized exchanges for trading tokenized assets. This infrastructure could evolve into a decentralized counterpart to traditional stock exchanges such as NYSE or NASDAQ—yet with unified global liquidity and seamless access to assets from the world's leading economies in digital form.

At this stage, the full potential of Layer 2 solutions will become evident. Projects at this level deliver high throughput, near-instant transaction execution, and low fees—critical requirements for operating a global decentralized exchange capable of processing tens of millions of transactions in real time.

Within such an architecture, it becomes possible to create modular liquidity pools supplied by users and deployed across multiple layers. For example, capital allocated to a liquidity pool can be utilized as a lending resource—including for sovereign or supranational entities—unlocking entirely new financing mechanisms built on tokenized assets.

The fifth layer may encompass automated, supranational financial systems, where capital flows without intermediaries and asset management becomes algorithmic, autonomous, and globally accessible. Its development depends on the integration of the preceding layers and is only beginning to take shape.

Taken together, this outlines a cohesive vision of systemic transformation: the Ethereum network, provided it maintains decentralized governance, has the potential to evolve into a new kind of global financial treasury. It would not only generate yield through financial operations but also create fully collateralized liquidity.

In this model, ecosystem participants use next-generation financial instruments to generate liquidity backed by real assets—not artificially expanded money supply. Each unit of liquidity is anchored in digital assets and carries intrinsic value.

Over time, such liquidity could be accessed by governments to cover short-term budget deficits or finance economic development. This approach reduces reliance on the issuance of unbacked fiat currency, which traditionally drives inflation. For emerging markets, it offers an alternative capital formation mechanism without triggering rapid currency devaluation.

Credit pools within this system must operate on a collateralized basis. The underlying collateral may include tokenized real-world assets as well as core crypto assets—primarily Ethereum and the reserve asset Bitcoin.

Path III: Other Digital Projects

All foundational blockchain projects are increasingly converging around the integration of DeFi, TradeFi, and RWA. These directions define the long-term trajectory of the industry and carry virtually unlimited growth potential. The key driver is no longer short-lived narratives or speculative trends but real, efficient tools with tangible utility. The engines of progress will be projects capable of delivering functional financial mechanisms, occupying distinct niches, and building sustainable business models.

Special attention should be given to projects where the integration of DeFi, TradeFi, and RWA is embedded at the architectural level—not merely used as a marketing layer. Among such projects are:

Uniswap
The project has a mature ecosystem and one of the largest liquidity clusters in the digital finance space, generating consistent revenue. Uniswap is focused on decentralized trading and is likely to remain a leading player in this niche over the next 5–8 years.

Ondo Finance
Focused on bringing core traditional finance instruments on-chain. The tokenization of government bonds, money market funds, equities, and ETFs provides global access to institutional-grade assets. Through partnerships with leading institutions, Ondo has the potential to become a key player in the tokenized securities market.

Solana
The team is focused on building a TradeFi-oriented platform designed to bridge TradeFi and RWA. The ecosystem has already implemented tokenized equities and launched stablecoins in partnership with Circle and Paxos. This strategic direction positions Solana as a competitor to Ondo and strengthens the stability of asset integration into blockchain infrastructure.

Avalanche

By 2030, Avalanche could become one of the leading platforms for enterprise, financial, and Web3 projects. The combination of DeFi, tokenized assets, and enterprise-grade solutions provides scalability, low fees, and compatibility with regulated financial processes. AVAX functions as the core network token, driving both ecosystem growth and liquidity.

Chainlink

Chainlink provides critical infrastructure for Web3, DeFi, and RWA through its oracle networks and cross-chain interoperability. Technologies such as CCIP and the Chainlink Runtime Environment enable large-scale integration of traditional finance and tokenized assets into decentralized ecosystems. LINK is used for oracle payments and staking, while the network itself is becoming mission-critical infrastructure for hundreds of projects.

Internet Computer

This project has the potential to evolve into a scalable blockchain supercomputer for Web3 and enterprise applications, replacing traditional cloud services. Technologies such as on-chain applications, canisters, and cross-chain integration enable the deployment of decentralized social networks, fintech services, and RWA projects. ICP is used for resource payments, staking, and governance, supporting sustainable ecosystem growth.

Fetch.ai

Fetch.ai is building a decentralized network of autonomous agents capable of communicating, learning, and executing tasks without centralized control. These applications span data optimization, automated decision-making, logistics, energy grids, and machine economy services.

Over the next 5–8 years, autonomous agents are expected to see widespread adoption in optimizing business processes, logistics, energy, and transportation networks. These agents may form global markets for automated services—from dynamic pricing systems to autonomous

operations in TradeFi and DeFi, where decisions are made by agents rather than centralized entities.

The Graph

A decentralized protocol for indexing and accessing smart contract data, enabling applications to efficiently query blockchain data. It serves as critical infrastructure for all Web3 services, as building scalable, high-performance applications without it is extremely challenging.

By 2030, The Graph is likely to become the standard for accessing on-chain data, supporting AI services, analytics, DeFi, RWA tools, and trading platforms. Between 2030 and 2035, as one of the core decentralized data layers for Web3, it may seamlessly support ML/AI services and agent-based protocols (such as Fetch.ai), providing an efficient and secure data platform for global systems.

Today, the foundational infrastructure is being built—connecting DeFi, tokenized real-world assets, and traditional financial instruments. These systems provide access to institutional-grade assets, create transparent and scalable platforms for trading and asset management, and integrate enterprise and Web3 services on a global scale.

It is important not to focus solely on current leaders. The ecosystem is constantly evolving, and new solutions with more efficient architectures may redefine future economic centers of gravity. The key is to monitor structural shifts—especially at the Layer 1 level—where architectural transformations and the future centers of economic gravity within the ecosystem are being established.

Key Takeaways from the Chapter

1. Future Outlook

Bitcoin will continue its global expansion as both a financial and investment instrument. Its evolution is governed by the internal logic of the network and its programmed rules, which remain unchanged regardless of external events. This stability and predictability secure Bitcoin's role as a cornerstone of the future financial landscape.

2. The Nature of Cyclicality

Cyclicality is a foundational pillar of Bitcoin. Each cycle has a fixed length—210,000 blocks—and this structure is immutable. The network's economic model clearly demonstrates the patterns that define cycle duration, miner reward dynamics, and overall market impact. The network's movement is always synchronized with its code, and all processes operate within its logic.

3. Vision for Bitcoin's Development

A hierarchy of epochs: epoch → meta-cycle → tri-cycle → cycle. Each level represents a transition point, with higher-order levels driving more significant transformations in both the network and Bitcoin's economic structure.

4. Vision for Ethereum's Role

Ethereum is positioned as a foundational infrastructure layer, serving as the backbone for financial ecosystems and enabling full interoperability across all types of financial instruments. This vision centers on creating a universal base where DeFi, tokenized assets, and traditional financial systems can coexist and interact seamlessly.

5. Vision for the Role of Other Projects

Each alternative project contributes to building a robust and scalable foundation for the new financial system. They extend the existing infrastructure by adding new layers that facilitate the integration of DeFi, tokenized assets, and innovative financial solutions.

8

CHAPTER

Investment Strategies

"Don't try to predict the market—invest wisely and regularly."
— John Bogle

We will explore approaches designed to reduce risk while unlocking growth potential in a highly volatile market environment. Each strategy is presented with a long-term perspective in mind, where patience, discipline, and a clear understanding of market cycles play a decisive role. The optimal entry point into the digital asset market is not about guessing the "perfect timing," but about initiating a structured and consistent investment process. This approach takes into account the cyclical nature of the crypto market, where alternating bull and bear phases can last for months—or even years.

One of the most effective strategies is to plan an investment horizon of 3–5 years. This allows investors to withstand market volatility and benefit from the sector's overall growth, as historically demonstrated by Bitcoin since the early 2010s. The longer an investor remains in the market, the more powerful the effect of compound interest becomes, while the impact of short-term price fluctuations gradually diminishes.

At the same time, it is essential to remember: investing in digital assets always involves elevated risk, and no strategy will be effective without a deep understanding of the asset's nature and its fundamental value.

Part I: DCA Strategy (Dollar-Cost Averaging)

The Dollar-Cost Averaging (DCA) strategy involves investing a fixed amount of money into digital assets at regular intervals, regardless of the current market price. The primary objective of DCA is to reduce the impact of volatility, avoid emotional decision-making, and eliminate the need to time market tops and bottoms.

How It Works?

An investor selects a fixed amount—say, $100 per month—and consistently purchases a chosen asset (Bitcoin, Ethereum, etc.):

- when the price is high → a smaller amount of the asset is purchased
- when the price is low → a larger amount is accumulated

Over time, this results in an averaged entry price, reducing the risk of buying at cycle peaks and creating a more balanced position.

Example:

- In January, Bitcoin is priced at $50,000 → $100 buys 0.002 BTC
- In June, the price drops to $25,000 → the same $100 buys 0.004 BTC

Total invested: $200

Total accumulated: 0.006 BTC

Average entry price: approximately $33,333 per BTC

In this way, price declines work in the investor's favor, allowing for greater accumulation and gradually lowering the cost basis. When prices rise, DCA enables continued investing without psychological pressure or the fear of "buying too high," maintaining discipline and consistency.

Advantages of the Strategy.

Digital assets are inherently volatile—price swings of 50–80% within a single cycle are common.

DCA helps to:

- accumulate assets during market downturns
- lower the average entry price
- minimize timing errors
- avoid emotional decisions during fear or euphoria phases.

The key factor for success is consistency and discipline: the strategy only works when investments are made regularly, regardless of market sentiment.

Risks:

- requires strong discipline and consistency
- does not eliminate the fundamental risk of prolonged market downturns
- may underperform in the short term during sharp market rallies.

Historical Context.

Using Bitcoin as an example, DCA since 2017 has demonstrated more stable outcomes compared to lump-sum investing.

An investor who allocated $10,000 as a one-time investment in 2021 at a price of around $50,000 experienced a portfolio drawdown of over -40% mid-cycle and up to -65% near the cycle bottom. The investment value dropped to approximately $3,500 and remained at those levels for an extended period—until the market recovery in 2024.

In a similar scenario, DCA significantly reduces psychological pressure and smooths capital drawdowns.

Practical Tips:

- define your total investment capital and the size of your periodic contribution (e.g., up to 5% of your portfolio)
- invest consistently (weekly or monthly), regardless of asset price
- maintain a long-term horizon (3–5 years or more)
- stay disciplined and avoid trying to “catch the market bottom”.

Part II: The Buy The Dip Strategy

The Buy The Dip strategy involves acquiring digital assets during short-term or mid-term price pullbacks when the market enters a correction phase. It is a more active approach than DCA, requiring basic market analysis skills and a higher level of investor engagement.

How It Works?

An investor analyzes the historical price dynamics of an asset, observing its behavior over an extended period. Within a single market cycle, most digital assets tend to exhibit regular corrections:

- on average, 10–20% within a year
- 2–3 significant pullbacks even within an overall uptrend.

These periods are used as entry points, where the investor gradually builds a position. The key is not to find the "perfect bottom", but to scale in systematically within a declining price range.

Example:

- In January, Bitcoin is priced at $50,000
- in April, the first correction occurs: −15% → $42,500
- in July, a second correction: −10% → $38,250
- by September, the price recovers to $55,000.

During the first correction, $100 is invested → 0.00235 BTC during the second, another $100 → 0.00261 BTC. In total, $200 is invested, acquiring 0.00496 BTC, with an average entry price of approximately $40,323 per BTC.

Compared to a lump-sum purchase at peak levels, this strategy allows investors to build a more favorable position with a lower risk of overpaying.

Advantages of the Strategy.

Buy The Dip performs particularly well in volatile markets, where prices frequently experience sharp and deep movements.

The strategy enables investors to:

- flexibly select entry points
- actively manage the average cost basis of a position
- capitalize more effectively on market corrections.

It is best suited for investors willing to dedicate time to market analysis. The key success factor is discipline and adherence to predefined entry ranges.

Risks:

- requires continuous market monitoring and analytical preparation
- false signals or missed corrections are possible
- increased psychological pressure, especially during deep drawdowns
- less effective in prolonged sideways markets
- risk of buying a "dip" that turns into the beginning of a bear market.

Historical Context.

Between 2021 and 2023, Bitcoin exhibited high volatility. After rising from approximately $29K to $64K in 2021, the market experienced significant corrections. In 2022, prices declined from around $48K to approximately $17K, accompanied by interim drops exceeding 20%. In 2023, fluctuations remained in the 10–15% range.

Investors who systematically applied the Buy The Dip strategy were able to lower their average entry price, accumulate assets, and benefit from the market recovery toward the end of this period.

Practical Tips:

- define your total investment capital and rules for its allocation in advance
- limit each individual investment to no more than 5% of total capital
- use limit orders or automated orders with predefined price zones
- monitor the market regularly but avoid impulsive decisions
- keep a 10–20% capital reserve for deeper corrections
- test different portfolio structures while managing risk exposure

- stay consistent—systematic execution reduces the impact of emotions during peak market phases.

Part III: The Combined Strategy (DCA + Buy The Dip)

The combined DCA + Buy The Dip strategy merges the consistency of regular investing with the flexibility to respond to market corrections. This approach not only reduces the impact of volatility but also enables investors to capitalize more effectively on price declines, improving their average entry position.

Unlike traditional DCA—where investments are made regardless of market conditions—the combined model introduces a structured baseline with additional allocations during corrections. The result is a more adaptive and balanced investment strategy.

How It Works?

The investor divides capital into two components::

- core allocation (70–80%)—used for regular investments based on the DCA principl
- reserve allocation (20–30%)—set aside for deployment during market corrections.

Base investments are executed regardless of the asset's price (weekly or monthly), while the reserve is deployed in situations such as:

- corrections of 10–15%
- deeper drawdowns of 20–30% or more
- periods of heightened volatility or panic selling.

Example:

An investor has $1,000:

- $800 is allocated through DCA ($100 per month)
- $200 is held in reserve.

Scenario:

- base investments build a position at the average market price
- during a −20% correction, the investor deploys $100 from the reserve
- during a deeper −30% decline, the remaining $100 is invested.

Result:

- the average entry price decreases faster than with standard DCA
- the overall position is built more efficiently
- the investor maintains control over risk and liquidity.

Advantages of the Strategy.

The combined approach allows investors to:

- balance discipline with flexibility
- capitalize more effectively on market corrections
- accelerate the reduction of the average cost basis
- reduce psychological pressure during downturns
- maintain continuous market exposure.

This strategy is widely considered one of the most balanced approaches, as it accounts for both long-term market trends and short-term fluctuations.

Risks:

- requires clear planning and disciplined capital allocation
- risk of deploying the reserve too early
- more complex to execute compared to standard DCA
- requires a basic understanding of market cycles and correction phases.

Practical Tips:

- clearly define the ratio between DCA and reserve (e.g., 70/30)
- avoid deploying the entire reserve after the first correction
- divide the reserve into multiple tranches (e.g., 3–4 entries)
- predefine drawdown levels for additional investments
- do not abandon regular investments, even during high volatility
- periodically review and adjust the strategy in line with market conditions.

Part IV: Portfolio Structure and Diversification

Portfolio structure in digital assets refers to the allocation of investments aimed at balancing risk and potential return. The core idea is diversification, which reduces dependence on any single asset or market segment.

A resilient, long-term-oriented portfolio is built on three key principles: balanced structure, effective diversification, and optimization of the risk–return ratio. This approach enhances portfolio stability and creates conditions for sustainable growth.

Core Portfolio Structure

- **Core Assets: 50–70%**

This is the foundation of the portfolio—the so-called crypto "blue chips." These assets are characterized by high liquidity, institutional backing, and resilience across different market cycles. They are typically the first to recover after downturns and often set the overall market direction.

Bitcoin should represent the dominant share of the portfolio, as it serves as the primary benchmark and a defensive asset within the crypto ecosystem.

- **Alternative Tokens: 20%**

This segment adds growth potential to the portfolio. It includes projects with clear utility and real-world use cases, such as Solana (high transaction throughput), Lido (staking infrastructure), Uniswap and Aave (DeFi), as well as Ondo or Plume (RWA).

These assets can deliver higher returns but come with increased risk compared to BTC and ETH.

- **Stable Assets: 10–20%**

Stablecoins (USDT, USDC) act as a financial buffer. They allow investors to preserve capital during periods of volatility and respond quickly to market opportunities—particularly by acquiring assets during corrections without realizing losses on other positions.

- **Other Assets: 3%**

This segment includes new and experimental early-stage projects. While the potential upside may be significant, the risk is also the highest. Therefore, exposure to such investments should remain limited.

The Importance of Diversification

Diversification is the allocation of capital across different assets and categories to reduce overall portfolio risk.

It enables investors to::

- withstand market downturns with fewer losses
- maintain flexibility across different phases of the market cycle
- combine stability with growth potential.

For beginner investors, this structure serves as an optimal starting point, as it is not dependent on short-term trends and is designed for consistent long-term results.

Examples of Typical Diversification:

Across Digital Assets::

- Bitcoin (BTC) — "digital gold," the base asset
- Ethereum (ETH) — smart contracts, DeFi, NFTs
- major Layer-1 networks (Solana, Cardano, Avalanche, etc.)
- stablecoins (USDT, USDC)

  sector-specific tokens (AI, GameFi, RWA, DePIN, etc.).

Across Asset Classes::

- cryptocurrencies
- equities (technology, mining, financial sectors, etc.)
- gold and other precious metals
- government bonds
- real estate
- cash.

Advantages of Diversification:

- reduces losses during declines in individual assets
- improves overall portfolio stability
- enables a mix of assets with different risk levels and correlations
- historically supports more consistent long-term returns.

Risks of Diversification:

- the portfolio must align with the investor's risk profile (conservative vs. aggressive)
- over-diversification can dilute overall returns
- it is optimal to focus on 5–10 key assets that form the core of the portfolio
- innovative and early-stage projects may lose all value, so only a limited portion of capital should be allocated to them.

Part V: Portfolio Rebalancing

Rebalancing is the periodic adjustment of a portfolio's structure to return it to predefined asset allocations. Its primary function is to maintain the intended risk profile while systematically locking in a portion of profits—since accurately timing a market top is virtually impossible.

How It Works?

Assume a target portfolio allocation of 60% BTC and 40% ETH. If, due to Bitcoin's price appreciation, its share increases to 70%, the portfolio's risk profile has shifted.

In this case, it is reasonable to:

- sell a portion of BTC
- increase exposure to ETH
- or partially take profits and build a reserve for future investments.

Similarly, if core assets are intended to represent 60% and alternative assets 20% but altcoins grow to, say, 25%, the portfolio should be adjusted by partially taking profits and restoring the intended risk balance.

When to Rebalance:

- quarterly
- when deviation from the target allocation exceeds 10%
- after significant market movements..

Practical Tips:

- if the portfolio is designed for a 5–10 year horizon, rebalance less frequently—only after substantial asset price changes (e.g., +50%, +100%, or +150%), gradually taking profits in stages
- during strong growth in higher-risk sectors (e.g., DeFi, emerging Layer 1s, or RWA), consider reducing exposure in favor of core assets or stablecoins to lower overall volatility
- define profit-taking rules in advance: at which price levels and what portion of the asset you plan to sell

- use automated or limit orders to avoid emotional decisions during periods of market euphoria
- leverage portfolio tracking tools to monitor asset allocation, transaction history, and deviations from target weights—this improves discipline and risk management quality.

Portfolio Rebalancing Algorithm

- **Step 1: Define the Target Allocation**

Establish your desired portfolio structure in advance (e.g., 60% BTC, 25% ETH, 10% altcoins, 5% stablecoins).

This serves as the baseline you return to during each rebalancing cycle.

- **Step 2: Set Rebalancing Triggers**

Define clear conditions under which you will act::

- deviation from target allocation exceeding 10%
- individual asset growth of 50%+
- a fixed schedule (e.g., quarterly).

This helps eliminate impulsive, emotion-driven decisions.

- **Step 3: Assess the Current Portfolio Structure**

Regularly analyze the actual allocation::

- what percentage each asset represents
- which positions exceed target weights
- which are underweighted within the portfolio.

- **Step 4: Make a Decision**

Based on the situation, choose one of the following actions::

- partially sell overweight assets
- increase exposure to underweighted assets
- build a reserve in stablecoins.

All decisions should align with your original strategy—not market emotions.

- **Step 5: Execute the Rebalancing**

Structure your trades carefully:

- avoid selling entire positions at once—scale out gradually
- use limit orders
- avoid single-point entries.

This reduces timing risk.

- **Step 6: Take Profits and Manage Liquidity**

A portion of profits can be:

- converted into stablecoins
- held as a reserve for future corrections
- or partially withdrawn from the market (if needed).

This enhances financial flexibility and reduces overall risk.

- **Step 7: Monitor and Repeat the Cycle**

After rebalancing:

- record the updated portfolio structure
- continue regular monitoring
- follow your predefined triggers for the next cycle.

Rebalancing is not a one-time action—it is a systematic, ongoing process.

Part VI: Behavior During Crisis Events

The entire history of digital assets has been marked by periods of sharp declines, panic, and elevated volatility. Volatility is a natural component of this market, particularly given its relative youth, technological foundation, and sensitivity to global events.

Most investors tend to act emotionally during crises—driven by anxiety, fear, or confusion. However, the investor's core objective is different: to learn how to detach from short-term emotions and assess situations rationally through the lens of a long-term strategy.

Events That Significantly Impacted the Market:

1. **March 2020**—pandemic-driven crash and global financial panic, decline of approximately −50%.
2. **May 2021**—mining ban in China: correction of approximately −54%.
3. **2022**—collapse of Terra/Luna and subsequent bankruptcies (including FTX), market decline of over −77% from peak levels.
4. **August 2023**—risks in China's real estate sector and global economic concerns, correction of around −18%.
5. **November 2024—March 2025** — trade tensions and economic pressure among major economies, market decline of approximately −30%

These examples demonstrate that the digital asset market is highly sensitive to both industry-specific events and macroeconomic factors. Crises cannot be fully avoided—uncertainty is an inherent characteristic of the market environment.

How to Use a Crisis to Your Advantage

With a clearly defined investment strategy, a long-term horizon, and emotional discipline, crisis periods shift from being a threat to becoming an opportunity.

It is during deep corrections that the most attractive entry points emerge. Assets with strong fundamentals are often traded at significant

discounts in these moments. For a prepared investor, this is not the end of a cycle—it is the accumulation phase.

Market history shows that the greatest returns are not generated during periods of widespread optimism but rather when the majority of participants exit the market under the pressure of fear.

A crisis is not an exception to the rules—it is an integral part of the cycle. Those who understand the nature of this cyclicality see it not as a threat but as a tool for shaping future returns.

Key Section Takeaways

1. Investment Strategy

The foundation of successful investing is a clearly defined strategy and consistent adherence to its principles. It provides a structured action plan, reduces the influence of emotions, and enables well-informed decision-making—even during periods of heightened volatility.

2. Investment Horizon

A long-term approach allows investors to navigate market corrections with greater confidence and minimizes the risk of impulsive decisions. Extended market exposure helps smooth volatility, leverage the power of compounding, and achieve more consistent results within the chosen strategy.

3. Investment Portfolio

Diversification across assets, sectors, and risk levels creates a balance between stability and growth potential. A portfolio-based approach transforms investing from a series of isolated decisions into a cohesive capital management system that remains resilient across different market phases.

4. Rebalancing

Systematic rebalancing enables investors to gradually take profits while maintaining the desired risk level—without attempting to time market peaks. Over the long term, this enhances portfolio stability and improves adaptability to changing market conditions.

5. Crisis Periods

Crisis phases are an inherent part of market cycles. With a clear strategy, a diversified portfolio, and emotional discipline, they shift from being a source of risk to an opportunity to accumulate assets at more favorable valuations.

Closing Remarks

And so, our first shared journey along this digital path comes to an end. It has been rich and dynamic—at times challenging, filled with turning points and moments of personal insight. And even where difficulties arose, they only reinforce the most important truth: everyone who has made it this far is already a winner. Because the true reward is not the finish line itself but the real experience you've gained along the way. It is this experience that opens new horizons before you—paths that are no longer limited.

If we imagine this journey metaphorically, it resembles a vast labyrinth—complex, multi-layered, nearly infinite, yet harmonious in its design. It takes the shape of a circle, and at its very center lies a point—a special place. This is the space of knowledge, understanding, and clarity. It holds all the clues about the labyrinth itself, about possible routes, entrances, and exits. But there is one essential condition—you can only reach it on your own. Every step, every decision, and every turn is part of building your personal path.

And now, you are at the center. At the point where you no longer need to search blindly. Here, you can consciously choose where to go next. And perhaps that is the most valuable outcome—not simply completing the journey but learning how to choose new ones.

Along the way, you have gained something else of significance—an artifact of this journey. This book is not merely a collection of text but rather a key to deeper meaning. It will stay with you as a reminder of the path you've taken and, at the same time, as a tool for future discovery. I sincerely encourage you to return to it again and again. Over time, you will begin to notice what once escaped your attention—subtle "Easter eggs," hidden insights, and new layers of understanding. Because each rereading reflects a new version of you, shaped by greater experience and depth.

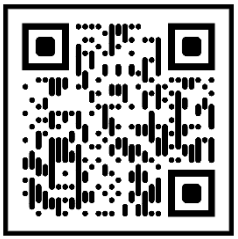
Let this ending not be a conclusion but a transition point—a threshold beyond which new paths unfold: bolder, broader, deeper, and more intentional. Your journey continues.

And even as this chapter comes to a close, it does not mark the end of our interaction. On the contrary—there are many more discoveries, insights, and experiences ahead. I would be glad to remain part of your continued progress.

To exchange ideas, share experiences, and explore new perspectives, you can always find me on Substack, Medium, and YouTube. That is where our dialogue can continue—at a new level: deeper, broader, and more intentional.

Until we meet again—on the next paths.

Medium



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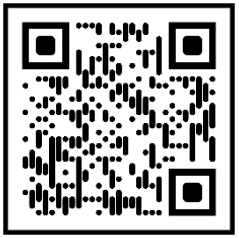
Substack



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Appendix:

A Basic Toolkit for Analyzing Crypto Projects and Tracking Development Activity (DYOR)

PRELIMINARY SCREENING		
DYOR		**Fundraising**
Bitwise	Grayscale	Cryptorank
GalaxyDigital	CoinShares	DropStab
Glassnode	Messari	CryptoFundraising
BlackRock	Berkshire	Messari Fundraising
FUNDAMENTAL ANALYSIS		
Whitepaper		
Official project resources and links		
Securities		Whitepaper
MARKET & FINANCIAL ANALYSIS		
Metrics	**Developer data**	**Staking**
Token Terminal	Developer Report	Staking Rewards
DefiLlama	CryptoMiso	CoinMarketCap
TOKENOMICS ANALYSIS		
Tokenomist	Chain Brocker	dyor
DEEP-DIVE ANALYSIS		
Onchain Data		
Arkham Intel	Nansens	Duna

SYSTEMATIC MONITORING	
Network Monitoring	
BitInfoChart	
Market Data	**Market Volume**
Cryptorank	Coinalyze
CoinMarketCap	Birdeye
CoinGecko	Altfins
CoinGlass	CoinAnk
TradingView	RealWorldAssets

Write down your ideas here
regarding digital assets